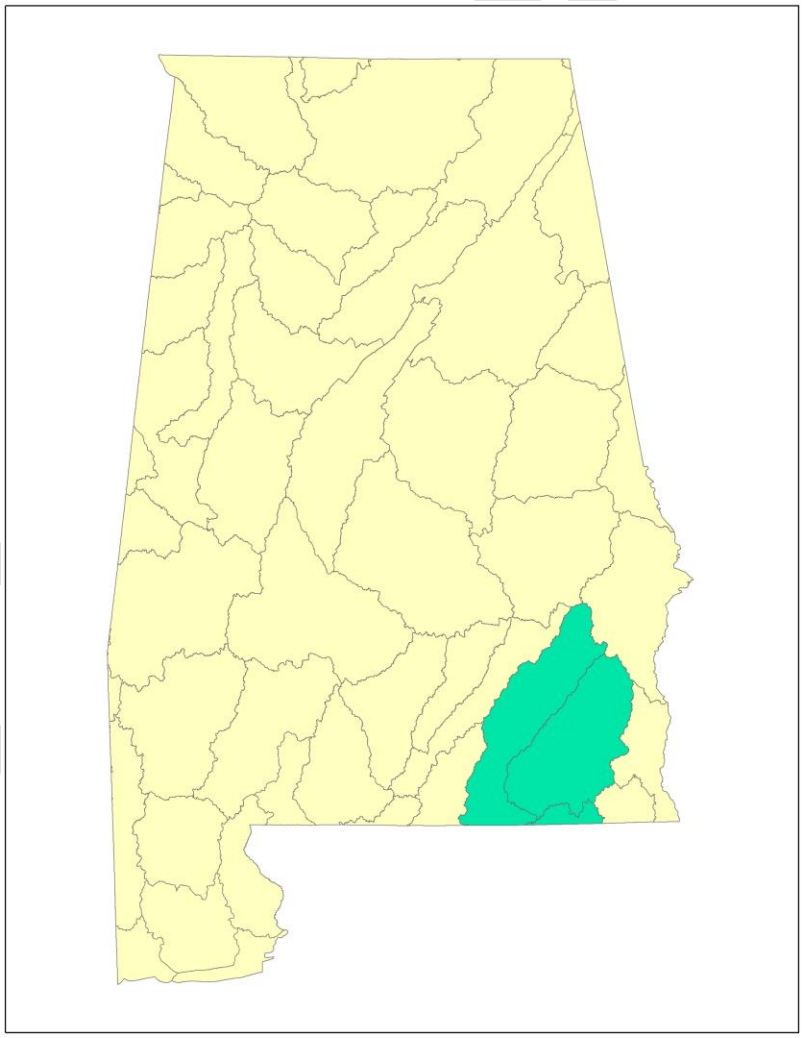
Choctawhatchee and Pea Rivers Sustainable Irrigation Expansion Project

Draft Programmatic Watershed Plan- Environmental Assessment
February 2021



United States Department of Agriculture, Natural Resources Conservation Service - Lead Federal Agency in cooperation with the Alabama Soil and Water Conservation Committee

Draft Programmatic Watershed Plan- Environmental Assessment
for the Choctawhatchee and Pea Rivers Sustainable Irrigation Expansion Project in
Barbour, Bullock, Coffee, Covington, Dale, Henry, Houston, Geneva, and Pike Counties, Alabama
Prepared by Auburn University with University of Alabama in Huntsville

Lead Agency: United States Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS), Alabama

Sponsoring Local Organization (SLO): Alabama Soil and Water Conservation Committee (ASWCC)

Authority: The Watershed Plan-Environmental Assessment (Plan-EA) has been prepared under the Authority of the Watershed Protection and Flood Prevention Act of 1954 (Public Law 83-566) as amended and supplemented. The Plan-EA was prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, Public Law 91-190, (42 United States Code [U.S.C.] 43221 et seq.).

Abstract: This document is intended to fulfill requirements of the NEPA and to be considered for authorization of Public Law 83-566 (PL-566) funding for irrigation expansion within the Choctawhatchee-Pea River Basin. The purpose of this project is to minimize damage to plant health and vigor, improve soil health, and protect basin water quality all of which are resources of concern associated with rainfed farming in Alabama. The uncertainty of climate model predictions supports the need for a reliable source of water, as risks to land, labor, and resources required to produce biomass associated with sustainable crops may occur. Supplemental irrigation coupled with conservation practices (such as cover crops and conservation tillage) provide the highest probability of mitigating this risk. The project seeks to directly reduce damages to the resources of concern by providing localized sustainable water management across approximately 16,800 acres in this Basin. Rather than predetermining a specific site location, this plan evaluates a large area comprised of 439,666 acres of existing farmland potentially suitable for project implementation. The SLO will use information provided in this Plan-EA to effectively identify ideal cost-share implementation sites. Once project site locations are identified and ranked according to the Farming Application Ranking Criteria (see Table E-2 in Appendix E), onsite Environmental Evaluations (EE) will be carried out by authorized NRCS personnel and tiered from this Plan-EA using Form NRCS-CPA-52, Environmental Evaluation Worksheet. Total estimated project costs are $73,670,860. Of this, $23,130,026 is the estimated amount to be paid through NRCS PL-566 funds and $50,540,835 would be paid as cost-share by the project participants. The projected benefit to cost ratio equates to 1.17.

Comments: The NRCS completed this Plan-EA in accordance with the NEPA and NRCS guidelines and standards. Comments should be provided to the NRCS during the allotted review period.

To submit comments, send an email to vernon.abney@al.usda.gov or via U.S. Mail to:

NRCS Alabama State Office
Attention: Vernon Abney, State Conservation Engineer
3381 Skyway Dr., Auburn, AL 36830-6443

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Watershed Agreement

Table of Contents

Watershed Agreement....4
Table of Contents....5
LIST OF TABLES....12
LIST OF FIGURES....14
Summary: Office of Management and Budget (OMB) Fact Sheet....16
1. Introduction....25
1.1 Decision Framework....27
2. Purpose and Need for Action....29
2.1 Project Basin Problems and Resource Concerns....29
3. Scope of the Plan-EA....30
3.1 Pre-Scoping....31
3.2 Agency, Tribal, and Non-Governmental Outreach....33
3.3 Public Outreach....46
3.4 Scoping Comments....47
3.5 Scoping Summary....63
4. Affected Environment....67
4.1 Location....67
4.2 Cultural and Historic Resources....70
4.3 Geology and Soils....78
4.3.1 Geology....78
4.3.2 Soils....79
4.3.2.1 Farmland Classification....82
4.4 Land Use....84
4.4.1 Land Ownership....86
4.5 Agriculture....86
4.5.1 Recent Change in Agricultural Production....86
4.5.2 Irrigation Status....87

4.5.3 Irrigation Adoption 89
4.5.4 Conservation Practices 89
4.5.5 Prime Farmland 91
4.6 Recreation 92
4.7 Socioeconomic Resources 93
4.7.1 General Population 93
4.7.2 Agricultural Statistics 95
4.8 Vegetation 99
4.8.1 Agricultural Crops 99
4.8.3 Noxious Weeds and Invasive Species 99
4.9 Water Resources 102
4.9.1 Water Quantity 102
4.9.1.1 Groundwater Quantity 102
4.9.1.2 Surface Water Quantity 116
4.9.2 Water Quality 122
4.9.2.1 Impaired Streams and TMDLs 122
4.9.2.2 Total Nitrogen 127
4.9.2.3 Temperature, Dissolved Oxygen, pH, Total Suspended Solids, Total Dissolved Solids, and Turbidity 128
4.10 Wetlands and Riparian Areas 128
4.11 Wildlife Resources 129
4.11.1 General Wildlife 129
4.11.2 MBTA/BGEPA Species 132
4.11.3 Federally Listed Species 133
4.11.4 State-Listed Species 134
4.12 Environmental Justice 137
4.12.1 National Scale Air Toxics Assessment 141
4.12.2 Average Farmer Net Income by Operation per County 144
4.13 Natural Areas 144
4.14 Floodplains 146

4.15 Topography 151
4.16 Climate 153
5. Alternatives 155
5.1 Formulation Process 155
5.2 Alternatives Eliminated from Detailed Study 155
5.2.1 Current/Conventional Expansion: Expansion of irrigation that supports 18/acre-inches per year 156
5.3 Alternatives Description 156
5.3.1 No-Action (Future without Project) 156
5.3.2 Alternative No. 2 - Sustainable Irrigation Expansion (SIE) Above Current Adoption 157
Alternative 2a: Application Equipment 158
Alternative 2b: Well + Application Equipment 159
Alternative 2c: Pond + Shallow Well + Application Equipment 159
5.4 Summary and Comparison of Alternatives 160
6. Environmental Consequences 166
6.1 Cultural Resources 173
6.1.1 No-Action (Future without Project) 173
6.1.1.1 Archaeological Resources 173
6.1.1.2 Historical Resources 173
6.1.2 Preferred Alternative 173
6.1.2.1 Archaeological Resources 173
6.1.2.2 Historical Resources 174
6.1.3 Compliance and Best Management Practices 176
6.2 Fish and Aquatic Resources 177
6.2.1 No-Action (Future without Project) 177
6.2.1.1 General Fish and Aquatic Species 177
6.2.1.2 Federally Listed Fish and Aquatic Species 177
6.2.2 Preferred Alternative 177
6.2.2.1 General Fish and Aquatic Species 177
6.2.2.2 Federally Listed Fish and Aquatic Species 178

6.2.3 Compliance and Best Management Practices 179
6.3 Geology and Soils 180
6.3.1 No-Action (Future without Project) 180
6.3.1.1 Geology 180
6.3.1.2 Soils 180
6.3.2 Preferred Alternative 180
6.3.2.1 Geology 180
6.3.2.2 Soils 181
6.3.3 Compliance and Best Management Practices 182
6.4 Land Use 183
6.4.1 No-Action (Future without Project) 183
6.4.2 Preferred Alternative 183
6.4.3 Compliance and Best Management Practices 184
6.5 Public Safety 184
6.5.1 No-Action (Future without Project) 184
6.5.2 Preferred Alternative 184
6.5.3 Compliance and Best Management Practices 185
6.6 Socioeconomic Resources 185
6.6.1 No-Action (Future without Project) 185
6.6.2 Preferred Alternative 185
6.6.2.1 Regional Economic Development 185
6.6.2.2 National Economic Development Benefits 185
6.7 Air Quality 186
6.7.1 No-Action (Future without Project) 186
6.7.2 Preferred Alternative 186
6.7.3 Compliance and Best Management Practices 187
6.8 Water Resources 187
6.8.1 No-Action (Future without Project) 187
6.8.1.1 Surface Water Hydrology 187
6.8.1.2 Surface Water Quality 187

Total Nitrogen Loads in Streams 187
Dissolved Oxygen 188
Water Turbidity 188
6.8.1.3 Groundwater Quality and Quantity 188
6.8.2 Preferred Alternative 188
6.8.2.1 Surface Water Hydrology 188
Current Irrigated Land Scenarios 189
10 Percent Irrigated Land Scenarios 189
All Agricultural Land Scenarios 189
6.8.2.2 Surface Water Quality 190
Increased Total Nitrogen Loads in Streams 190
Water Turbidity 190
Indirect Effects 190
Temporary Impacts 191
6.8.2.3 Groundwater Quality 191
Groundwater Leaching 191
Groundwater Leaching 191
Groundwater Leaching 192
6.8.2.4 Groundwater Quantity 192
Current Irrigated Land Scenarios 193
10 Percent Irrigated Land Scenarios 193
All Agricultural Land Scenarios 193
6.8.3 Compliance and Best Management Practices 194
6.9 Wetlands and Riparian Areas 194
6.9.1 No Action (Future without Project) 194
6.9.1.1 Wetlands 194
6.9.1.2 Riparian Areas 194
6.9.2 Preferred Alternative 194
6.9.2.1 Wetlands 194
6.9.2.2 Riparian Areas 195

6.9.3 Compliance and Best Management Practices 196
6.10 T&E and MBTA/BGEPA Species 196
6.10.1 No-Action (Future without Project) 196
6.10.1.1 T&E Species 196
6.10.1.2 MBTA/BGEPA Species 196
6.10.2 Preferred Alternative 196
6.10.2.1 Threatened and Endangered Species 196
6.10.2.2 MBTA/BGEPA Species 197
6.10.3 Compliance and Best Management Practices 198
6.10.3.1 T&E Species 198
6.10.3.2 MBTA/BGEPA 198
6.11 Cumulative Effects 200
6.11.1 Cumulative Effects by Resource 200
7. Consultation, Coordination, and Public Participation 216
7.1 Consultation 216
7.2 List of Persons and Agencies Consulted 217
7.3 Review of the Draft Plan-EA 219
8. Preferred Alternative 220
8.1 Selection of the Preferred Alternative 220
8.2 Rationale for the Preferred Alternative 220
8.3 Measures to be Installed 220
8.4 Minimization, Avoidance, and Compensatory Mitigation Measures 221
8.4.1 Soil quality degradation 228
8.4.2 Water quantity loss based on irrigation method 228
8.4.2.1 Sprinkler Irrigation Losses 228
8.4.2.2 Surface Irrigation Losses 229
8.4.3 Poor Plant Conditions 229
8.4.4 Maintaining Fish and Wildlife Habitat 230
8.4.5 Inefficient Energy Use in Irrigation 230
8.4.6 Pre-Construction 231

Application Ranking Process 231
Environmental Evaluation 231
8.5 Permits and Compliance 231
8.6 Costs 232
8.7 Installation and Financing 233
8.7.1 Framework for Carrying out the Plan 233
8.7.2 Planned Sequence of Installation 233
8.7.3 Responsibilities 233
8.7.4 Contracting 234
8.7.5 Financing 234
8.7.6 Conditions for Providing Assistance 234
8.8 Operation, Maintenance, and Replacement 236
8.9 Economic and Structural Tables 236
9. References 240
10. List of Preparers 246
11. Distribution List 247
12. Acronyms, Abbreviations, and Short Forms 248

LIST OF TABLES

Table 3-1. Agency and NGO Coordination during Scoping Process 35
Table 3-2. Public Coordination during Scoping Process 40
Table 3-3. Agency Scoping - Comments Received 48
Table 3-4. Comments Received during the August 20, 2019 Farmer Scoping Meeting 58
Table 3-5. Summary of Resource Concerns for the Choc-Pea Basin Area - Irrigation Expansion Project 63
Table 4-1. NRHP and NHL properties identified within the Choc-Pea Basin 71
Table 4-2. ARLH Resources within the Choc-Pea Basin 72
Table 4-3. Land Use and Acreage 84
Table 4-4. Change in Agricultural Land and Farms from 2012-2017 87
Table 4-5. Current Irrigation Status of Harvested Cropland (2018) 88
Table 4-6. Conservation Tillage and Cover Crop Usage in Choc-Pea Counties (2017) 90
Table 4-7. Comparison of Conservation Tillage and Cover Crops Planted Between Neighboring States 91
Table 4-8a. Socioeconomic Values for Choc-Pea Basin 93
Table 4-8b. Socioeconomic Values for Choc-Pea Basin, the State of Alabama, and the United States 94
Table 4-9. Farm Operator Demographics 96
Table 4-10. Methods Used in Deciding When to Irrigate: 2013 96
Table 4-11. Reasons for Discontinuing Irrigation 97
Table 4-12. List of Invasive Plant Species Occurring in the Choc-Pea Basin 99
Table 4-13. Information on Major Aquifers in the Choc-Pea Basin 110
Table 4-14. Annual Recharge Rates for the Major Aquifers in the Choc-Pea Basin 115
Table 4-15. Total Groundwater Withdrawal Budget for Choc-Pea Basin 115
Table 4-16. Average Surface Water Flows (cfs) for the three watersheds in the Choc-Pea Basin 116
Table 4-17. Upper Choctawhatchee River - Demand Data (2010) 118
Table 4-18. Pea River - Demand Data (2010) 119
Table 4-19. Lower Choctawhatchee River - Demand Data (2010) 120
Table 4-20. TMDLs in Choc-Pea Basin 123

Table 4-21. Common Wildlife Species that Occur in the Vicinity of Agricultural Crop Land within the Choc-Pea Basin 130
Table 4-22. List of MBTA and BGEPA Species Potentially Occurring within the Choc-Pea Basin 133
Table 4-23. List of Federally Listed Species Potentially Occurring Within the Choc-Pea Basin 134
Table 4-24. State-Listed Species Potentially Occurring in the Choc-Pea Basin that are Considered Critically Imperiled or Imperiled 135
Table 4-25. Environmental Justice Index Variables for the Approximate Area of the Choc-Pea Basin 138
Table 4-26. National Air Toxics Assessment Risk Report by County 142
Table 4-27a. Landfill Locations within the Choc-Pea Basin 143
Table 4-27b. Landfill Locations within the Choc-Pea Basin 143
Table 4-28. USDA NASS Net Income of Farms by Operation in Dollars (2017) 144
Table 4-29. List of Natural Areas Within Choc-Pea Basin 145
Table 4-30. Communities that Participate in The National Flood Insurance Program 147
Table 5-1. Comparison of Alternatives 160
Table 6-1. Intensity Threshold Table 167
Table 6-2. Potential Impacts on the Resources of Concern Estimated for Each of the Alternatives 201
Table 6-3. Summary of Compliance and BMPs for the Alternatives 212
Table 7-1. Consulting Entities per Resource Concern 216
Table 7-2. List of Consulting Entities for the Choc-Pea Basin 217
Table 8-1. Potential Mitigation Measures 223
Table 8-2. Irrigation Costs Per Acre for Various Systems 232
Table 8-3. Estimated Project Financing and Costs Choc-Pea Basin Area, Alabama, 2020 Dollars ($) 235
Table 8-4. Economic Table 1-- Estimated Installation Cost, Choc-Pea Basin, Alabama, 2020$ 237
Table 8-5. Economic Table 2- Estimated Cost Distribution Irrigation Equipment Investment, Choc-Pea Basin, Alabama, 2020$ 238
Table 8-6. Economic Table 4- Estimated Average Annual NED Costs, Choc-Pea Basin, Alabama, 2020$ 238
Table 8-7. Estimated Average Annual Watershed Protection Damage Reduction Benefits, Choc-Pea Basin, Alabama, 2020$ 239

Table 8-8. Comparison of Average Annual NED Costs and Benefits, Choc-Pea Basin, Alabama, 2020$.....239

LIST OF FIGURES

Figure 1-1: Historical Corn Yields and June Precipitation Minus Evapotranspiration (PME) for Headland, AL (1951 – 2006).....26
Figure 4-1: Map of the Project Basin.....68
Figure 4-2: Map of Congressional District Overlapping the Choc-Pea Basin.....69
Figure 4-3: Identified National Register of Historic Places and Alabama Register of Landmarks and Heritage Sites.....76
Figure 4-4: Identified Historic and Named Cemeteries.....77
Figure 4-5: Map of Simplified Geology Within Choc-Pea Basin.....78
Figure 4-6: Soil Areas of Alabama.....80
Figure 4-7: STATSGO Map of Soil Types.....81
Figure 4-8: SSURGO Map of Soil Types.....82
Figure 4-9: Soil Capability Classes in the Choc-Pea Basin.....83
Figure 4-10: Map of Land Use Within the Choc-Pea Basin.....85
Figure 4-11: Existing Irrigation Density by HUC-12.....88
Figure 4-12: Map of Irrigated and Non-Irrigated Agricultural Land.....89
Figure 4-13: Prime Farmland in the Choc-Pea Basin.....92
Figure 4-14: Aquifer Recharge Zones Within the Choc-Pea Basin.....103
Figure 4-15: Clayton Aquifer Within the Choc-Pea Basin.....104
Figure 4-16: Gordo Aquifer Within the Choc-Pea Basin.....105
Figure 4-17: Nanafalia Aquifer Within the Choc-Pea Basin.....106
Figure 4-18: Ripley-Cusseta Aquifer Within the Choc-Pea Basin.....107
Figure 4-19: Salt Mountain Aquifer Within the Choc-Pea Basin.....108
Figure 4-20: Location of Wells Within Choc-Pea Basin.....114
Figure 4-21: Stream Order Map for Choc-Pea Basin.....122
Figure 4-22: Map of 303(d) Listed Streams Within Choc-Pea Basin.....126

Figure 4-23: Map of Approved TMDLs Within Choc-Pea Basin 127
Figure 4-24: Wetlands in the Choc-Pea Basin 129
Figure 4-25: Strategic Habitat Units 132
Figure 4-26: Wastewater Discharge Indicator Index by County in Basin Area from EJSCREEN Data 141
Figure 4-27: Map of Natural Areas Within the Choc-Pea Basin 146
Figure 4-28: 100-Year and 500-Year Flood Hazard Zones 150
Figure 4-29: Topography in the Choc-Pea Basin 151
Figure 4-30: Slope Gradients Within Choc-Pea Basin 152
Figure 4-31: Average Monthly Minimum Temperature (left) and Maximum Temperature (right) in Units of ^{o}F for the Choc-Pea Basin for the Period 1981-2010. 153
Figure 4-32: Average Monthly Precipitation in Units of Inches for the Choc-Pea Basin for the Period 1981-2010. 153
Figure 4-33: Cumulative Distribution Function for Daily Precipitation Values for the Choc-Pea Basin for the Period 1981-2010 154

Summary: Office of Management and Budget (OMB) Fact Sheet

Summary Programmatic Watershed Plan- Environmental Assessment for the Choctawhatchee and Pea Rivers Sustainable Irrigation Expansion Project Barbour, Bullock, Coffee, Covington, Dale, Geneva, Henry, Houston, and Pike Counties Alabama 2nd Congressional District	
Authorization	Public Law 83-566 Stat. 666 as amended (16 U.S.C. Section 1001 et seq.) 1954.
Lead Sponsor	Alabama Soil and Water Conservation Committee (ASWCC)
Proposed Action	In an effort to protect existing farmland, agricultural labor, and valuable resource inputs, the proposed action would utilize allocated PL-566 funds to irrigate 16,800 acres of existing non-irrigated agricultural land within the Choctawhatchee-Pea (Choc-Pea) Basin Area.
Purpose and Need	The purpose of this project is to minimize damage to plant health and vigor, improve soil health, and protect basin water quality all of which are resources of concern associated with rainfed farming in Alabama. Climate change projections vary from more precipitation arriving in extreme, less frequent storms to less precipitation accompanied by increased temperatures. The uncertainty of climate model predictions supports the need for a reliable source of water, as risks to land, labor, and resources required to produce biomass associated with sustainable crops may occur. This project is needed to address untimely and inadequate precipitation, which results in less biomass development and impacts to plant health and vigor. Reduced biomass limits the incorporation of critical organic matter into the soil, reducing soil health. Nutrient use efficiency is decreased when plant health and vigor is impacted, which increases nutrients available for export. By developing diffuse or decentralized on-farm irrigation systems suitable for the farming practices in the Choc-Pea, resilience of the agricultural resources of concern is enhanced and the risk of damages can be greatly reduced. The project would be developed such that it adheres to State and Federal law and sustainably uses water systems. Implementation of the proposed action would satisfy the PL-566 Authorized Project Purpose, Agricultural Water Management (AWM), through irrigation and agricultural water supply for the benefit of local landowners and communities.
Description of the Preferred Alternative	The project would support the sustainable expansion of supplemental irrigation within the Choc-Pea Basin. Irrigated acreage within this area increased at an average of 3,151 acres per year from 2006-2015 (Handyside, 2017). Despite the variability involved in calculating the yearly average, the Sustainable Irrigation Expansion (*SIE*) Alternative is projected to increase that rate by forty percent (i.e., 4,200 acres per year) until available program funds are expended (approximately

	four years). Depending on farmer application needs, this alternative will allocate funding for the development or additions to water delivery/supply infrastructure and/or irrigation application equipment at the farm level; provided that previously rainfed acres are converted to newly irrigated acres.	
Project Measures	The irrigation practices proposed for cost-share include Low Pressure Center Pivots, Micro-Irrigation, Linear/Lateral Irrigation, Tow/Traveler Irrigation, Plasticulture, and Hand-Moved/Solid Set Sprinklers. Power systems available for cost-share may include but are not limited to phased electricity and power units. The sources of water that will potentially be used for the diffused irrigation systems include surface stream and/or groundwater, depending on what sources are available at the specific site level. The type of irrigation infrastructure and necessary practices (e.g., pipes, pumps, power, application equipment, well development) and water source selected will vary depending on specific site location and project applicant needs.	
Resource Information		
Project Area		
Watershed Names	8-digit Hydrologic Unit Code	
Lower Choctawhatchee	03140203	
Upper Choctawhatchee	03140201	
Pea	03140202	
Sub-watersheds- 12-digit Hydrologic Unit Code (HUC-12)	Number of HUC-12 Watersheds Overlapping the Choc-Pea Basin Area	HUC-12 Watersheds with Existing Agriculture
	111	111
Climate and Topography	The project area is located in a warm temperate climate that is fully humid with hot summers. The average annual precipitation is 57 inches, with the maximum monthly value recorded in July at about 6.4 inches, and the minimum monthly value recorded in October at about 3.3 inches. The lowest minimum temperatures occur in December and January, with values between 35 and 40 ºF. The highest maximum temperatures occur in July and August with values approaching 90 ºF. Topography is generally characterized by gently rolling hills, sharp ridges, prairies, and alluvial flood plains. Elevation in the project area ranges from 62 to 692 feet.	

Land Use in the Choc-Pea Basin (total 1,988,597 acres)	Use	Acres	Percentage of the Basin	
	Agriculture	461,837	23.2%	
	Developed	128,694	6.5%	
	Open Water	16,154	0.8%	
	Wetlands	92,523	4.7%	
	Forested Land	973,840	49.0%	
	Shrubland	315,436	15.9%	
	Barren	114	0.0%	
Land Ownership in Alabama	Owner	Percentage		
	Private	92.9%		
	State-Local	7.1%		
Population and Demographics		Alabama	Choc-Pea Basin	
	Population	4,887,871	~350,000	
	Population Below Poverty Rate	16.90%	22.4%	
	Per Capita Income	$40,805	$36,018	
Agricultural Production Land - Irrigation	Type	Acres	Percentage of Total Land	Percentage of Total Agricultural Land
	Irrigated Land (center pivot)	22,171	1.1%	4.8%

	Non-Irrigated Land	439,666	22.1%	95.2%
Agricultural Production Demographics within Choc-Pea Basin	Prime Farmland in Project Area		609,825 acres	
	Farmland of Statewide Importance		0	
	Change in Farmland Acreage from 2012-2017			-13.81%
	Change in number of Farms from 2012-2017			-10.29%
	Minority Operators			29.6%
	Full-time Operators (averaged)			39.9%
	Part-time Operators (averaged)			60.1%
Relevant Resource Concerns	Resource concerns identified through scoping are loss of farmland, underutilized agricultural resource inputs, water conservation and quality, groundwater, threatened and endangered species, soil resources, cultural and historic resources, socioeconomics, and land use.			
Alternatives				
Alternatives Considered	Three alternatives were considered; one was eliminated from full analysis due to cost, logistics, existing technology and regulations, and environmental reasons. The No Action Alternative and *SIE* above current Adoption Alternative were analyzed in full.			
No Action Alternative	Under the No Action Alternative, the increase of agricultural land under new irrigation may occur at approximately 3,151 acres per year, based on recent adoption trends from 2006-2015. However, the first seven years of these adoption trends only saw an average increase of about 819 acres per year. A much higher rate of adoption occurred during 2013-2015 (6,876-acre increase), resulting in more than half of the total acres adopted during the nine-year period. The need for the project would persist indefinitely, considering the lack of available cost-share for irrigation expansion. Taking into account the disparities presented by other factors such as land conversion, it cannot be assumed that farmers will continue adopting new irrigation or that irrigation adoption trends will remain constant over time.			
Proposed Action	One action alternative was studied in more detail. Under the *SIE* Alternative, PL-566 funding will be offered as cost-share by the SLO to support the implementation of site-specific infrastructural needs to put currently dry production			

	land under irrigation. Funding is available to meet farmer's needs for power, pumps, pipes, developing or expanding upon existing water sources, and the following application equipment practices low pressure center pivots, micro-irrigation, linear/lateral irrigation, tow/traveler irrigation, Plasticulture, and hand-moved/solid set sprinklers, as well as telemetry and remote operation of irrigation practices along with irrigation prescriptions and scheduling assistances for a period of three years. The funding provided will depend on project applications and requirements and will be capped at $200,000 per individual producer. The *SIE* Alternative has been identified as the National Economic Development (NED) plan and is also the Preferred Alternative.					
Mitigation, Minimization, and Avoidance Measures	Expanding irrigation will increase withdrawals from both surface and groundwater sources. However, the volume of water use anticipated at the highest threshold is considered a minor use of the overall quantity of water available in the basin. Avoiding overtaxing water supplies includes the promotion of a "distributed" expansion, avoiding concentrating irrigated acreage in particular HUC-12 sub-basins. Minimization measures include site selection criteria that promotes use of existing, underutilized water sources. Other minimization measures include priority selection of farms with demonstrated conservation practices (e.g., cover crops, conservation tillage, and irrigation efficiency technologies) and best management practices. Once a potential site has been identified for project implementation, authorized NRCS personnel will conduct a site-specific environmental evaluation using the CPA-52 form. This evaluation will determine risks to riparian, wetland, fish and aquatic species, soil erosion, water quantity/quality, invasive species, cultural and historic sites while also determining any additional mitigation features necessary. If there are no extraordinary circumstances present, this form will be tiered to the Plan-EA. Additionally, Alabama NRCS and the US Fish & Wildlife Service have developed a protocol to address T&E Species. This programmatic agreement will be followed, utilizing a decision diagram, conservation practice matrix with potential effects, and recommended courses of action.					
Project costs	**PL 83-566 funds**		**Other Funds (Farmer Cost-Share)**		**Total**	
Irrigation Equipment	$21,769,436	54.5%	$18,174,483	45.5%	$39,943,919	(100%)
Engineering/Construction	Not Applicable					
SUBTOTAL COSTS	$21,769,436	56.0%	$18,174,483	44.0%	$39,943,919	(100%)
Technical assistance	$1,360,590	100%	0		0	(100%)
Total OM&R	0	0%	$32,366,351		100%	(100%)
Permitting	Will be borne by the applicant if necessary					

TOTAL COSTS	$23,130,026	32.5%	$50,540,835	67.5%	$73,670,860	(100%)
Project Benefits						
Project Benefits	Implementation of sustainable irrigation, the Preferred Alternative, would improve plant health and vigor, soil health, and protect water quality through the reduction of crop biomass loss. Irrigated crops produce more organic matter when combined with conservation practices, improving soil health. This contributes to better water-holding capacity and more efficient water availability, further reducing resource input requirements. Sustainable irrigation will protect water quality through improved use of nutrients compared to rainfed crops during a drought.					
Number of Direct Beneficiaries	The number of direct beneficiaries will depend on the number of entities that apply for program assistance and the amount of funding requested. Each applicant will be limited to $200,000. Based on the average farm size within this basin (150 acres) and estimated funding, up to approximately 105 farmers may receive direct project funding.					
Other Beneficial Effects-Physical Terms	Secondarily, expanding irrigation would sustain farmland, protect labor, and decrease damages to crop yields.					
Damage Reduction Benefits	Implementation of the Preferred Alternative would provide supplemental irrigation during critical months of the growing season, thereby reducing crop loss resulting from decreased plant health and vigor. Inadequate precipitation for rainfed crops can lead to a production deficit for farmers in the Basin, which occurs when yields fall below the sustainable threshold (e.g., 109 bu/acre for corn). Historical data for the month of June indicate that decreased corn yields in rainfed systems are correlated to precipitation deficits approximately 40 percent of the time.					
Total Quantified Benefits	$99,995,397					
Benefit to Cost Ratio	1.17					
Installation Period (years)	4					
Useful Life of Irrigation	20 years					
Period of Analysis for Project Lifetime of Equipment	24 years					
Regional Economic Development Net Benefit	$1,389,961					

Funding Schedule		
Year	Other Funds	Total
2020-2030	$18,174,483	$41,304,509

Environmental Effects

Air Quality – The Preferred Alternative is anticipated to have negligible and temporary effects on air quality from an increase of N_2O emissions resulting from the enhanced fertilizer applications which are usually done in conjunction with crop irrigation. Considering the average farm size in the Choctawhatchee and Pea watersheds, rainfed and irrigated scenarios, model results indicate that irrigation increases yield which increases soil organic matter, including carbon capture, reducing C by 0.8 CO_2 metric tons equivalent per year. However, increased fertilizer application (NO_2) creates an increase of 4.0 CO_2 metric tons equivalent per year. Given the relatively small areas and increase in application rates, impacts would be negligible and temporary.

Cultural and Historic Resources – There are numerous previously identified cultural and historic resources throughout the basin. Quantifying the potential impacts on both known and heretofore unidentified cultural and historic resources is difficult at the watershed level. For the Preferred Alternative, available data concerning historic and cultural resources has been provided in the Appendix. As specific project sites are selected, each project will undergo site-specific review and evaluation as outlined in the Environmental Evaluation Worksheet (NRCS-CPA-52), Alabama NRCS Cultural Resources Review form (see Appendix E, Figure E 34), and the State-based Prototype Programmatic Agreement (SPPA) between the Alabama NRCS State Office and the Alabama Historical Commission. The site-specific evaluation and review process should ensure there are no known or heretofore unknown cultural and historic resources that are adversely affected. Based on this approach, the anticipated impacts are expected to be negligible to minor.

Fish and Aquatic Resources – A variety of fish and aquatic species exist in the watershed and the project area overlaps designated Critical Habitat for one fish and five freshwater clam federally listed species. Quantifying the potential impact on fish and aquatic species is difficult at the watershed level. For the Preferred Alternative, all available data concerning T&E species has been provided and will be used as guidance and overview as specific project sites are identified. After selection, each site will also undergo onsite evaluations as outlined in the Environmental Evaluation Worksheet (NRCS-CPA-52). Expanding irrigation will involve practices that may require site-specific consultation with the U.S. Fish & Wildlife Service (USFWS) based on the "Alabama NRCS Practice Effects on Threatened and Endangered Species" (see Appendix E, Table E-1 and Figure E-32). Each of the project-approved practices results in a "no effect", "mitigating action", and/or specific "on-farm consult". Based on this approach, the anticipated effects are expected to be negligible to minor.

Geology & Soils – The Preferred Alternative will result in minor soil disturbance during the installation period. However, these effects will be short-term and localized to the irrigation installation site. Effects would be further minimized through implementation of soil stabilization measures during installation. The Preferred Alternative may result in increased runoff that could also carry sediment. Effects will be mitigated through NRCS conservation practices as part of the site selection process. Irrigated crops produce more organic matter when combined with conservation practices (emphasized in the site selection criteria) which improves soil health. This

contributes to better water-holding capacity and more efficient water availability, further reducing resource input requirements. Sites identified for implementation will also undergo onsite evaluations as outlined in the Environmental Evaluation Worksheet (NRCS-CPA-52) to identify and resolve additional mitigation measures required to reduce erosion. Anticipated effects are expected to be minor.

Land Use – The Preferred Alternative will have no effect on land use adjacent to the project area, as property ownership and existing use of land would not change. The project is designed to utilize existing farmland. The Preferred Alternative will encourage and promote continued agricultural land use in the basin area through the adoption of irrigation and minimization of risk of crop loss.

Public Safety – The Preferred Alternative may result in temporary safety risks during installation, operation and maintenance of the system due to heavy equipment, high-voltage electricity and use of petroleum products. Any short-term risks to public health and safety could be mitigated. Installing irrigation systems on existing farmland should not result in any permanent change to transportation routes. Expanding irrigation has the potential to create minor delays on local roads during installation. However, these would be brief.

Recreation – The Preferred Alternative is anticipated to have no effect/neutral effect on recreation. Considering the potential project areas are already designated and being used for agricultural production currently, there are no recreational opportunities present in the proposed project area.

Socioeconomics – The Preferred Alternative has an estimated annual RED benefit of $1,389,961. A NED benefit cost analysis has been performed to evaluate the costs and benefits of increasing on-farm irrigation systems compared to the No Action Alternative. The NED Net Benefit (Average Annual Equivalent) of $623,301 is estimated with a benefit cost ratio of 1.17.

T&E and MBTA/BGEPA Species - There are approximately twelve T&E species within the project area including three species of plants, one species of fish, one species of reptiles, two species of birds, and five species of clams. Quantifying the potential impact on T&E and MBTA/BGEPA species is difficult at the watershed level. For the Preferred Alternative, all available data concerning T&E and MBTA/BGEPA species has been provided and will be used as guidance and overview as specific project sites are identified. After selection, each site will also undergo onsite evaluations as outlined in the Environmental Evaluation Worksheet (NRCS-CPA-52). Expanding irrigation will involve practices that may require site-specific consultation with the U.S. Fish & Wildlife Service (USFWS) based on the “Alabama NRCS Practice Effects on Threatened and Endangered Species” (see Appendix E, Table E-1 and Figure E-32). Each of the project-approved practices results in a “no effect”, “mitigating action”, and/or specific “on-farm consult”. Based on this approach, the anticipated effects are expected to be negligible to minor.

Vegetation – The Preferred Alternative will have negligible to minor positive effects on vegetation. Conversion of existing rainfed farmland to irrigated farmland may result in additional soil moisture for surrounding vegetation.

Visual Resources – The Preferred Alternative will have negligible to minor effect on the landscape. Existing farmland in the project area is not designated scenic and the irrigation features do not attract additional attention to the landscape.

Water Quantity – The Preferred Alternative will have minor effects on both the surface and groundwater supply. Currently there are approximately 22,171 irrigated acres in the watershed. Current average irrigation demand from groundwater supplies is less than one percent of any aquifer recharge in the Basin. On average, 64 percent of irrigation withdrawals in the basin are surface water sources while 36 percent of irrigation withdrawals are from groundwater. Promoting expanded irrigation in HUC-12s that have less than 10 percent of the overall drainage areas irrigated is recommended to protect local water supplies and existing irrigation investments. This is to further ensure impacts to local water resources are negligible to minor in intensity but would still allow 168,975 additional irrigated acres in the basin.

Water Quality - The Preferred Alternative is anticipated to have minor effects on both surface and groundwater quality. Currently there are 36 303(d)-listed streams in the basin, although only one of these streams is listed as impaired due to agricultural activity. Water quality could be impacted by increased nutrient runoff into surface waters, increased turbidity due to sediment transport and/or biological productivity, or nutrient leaching into groundwater due to irrigation applied in excess of field capacity. If irrigation is applied using best management practices, negative impacts are not anticipated. Supplemental irrigation can improve water quality through improved nutrient use efficiency of nutrients compared to rainfed crop during a drought. Projections for increased sediments or nutrients carried by surface waters are minor assuming the soil moisture is maintained at or below field capacity.

Wetlands and Riparian Areas – The Preferred Alternative is anticipated to have no adverse impacts on wetlands. The groundwater analyses previously described show that the water table in the region will not be adversely impacted so that the depth and extent of wetlands should remain unchanged. The planned spray and drip irrigation systems will not cause erosion and associated sediment transfer that could fill wetlands and reduce water quality. Expanded irrigation may result in slight increases of runoff and nutrient loads at some sites near existing wetlands. However, supplemental irrigation can improve water quality through improved nutrient use efficiency compared to rainfed crop during a drought. Installation of irrigation systems and related items may temporarily impact wetlands by increasing erosion and runoff from short-term construction activities to access water resources for irrigation. An on-farm evaluation (EE) per NRCS-CPA-52 will be required on a case-by-case basis to determine impacts and any required mitigation measures. Also, NRCS Conservation Measures as defined in the "Alabama NRCS Practice Effects on Threatened and Endangered Species" may be required to determine if additional mitigation measures are needed.

Wild and Scenic River - There would be no effects from the Preferred Alternative on the Wild and Scenic River or State Scenic Waterways designation. There are no Wild and Scenic Rivers in or directly downstream of the project basin.

Major Conclusions	Implementation of the Preferred Alternative would support the modernization of agricultural production and land use in this basin by protecting plant health and vigor, improving soil health, and protecting water quality by supplementing soils with poor water holding capacity during periods of uneven rainfall distribution, improve recovery of water stressed systems, and improve reliability of available water for farmers.
Areas of Controversy	There have been no areas of significant controversy identified. A few minor issues were raised in the scoping, assessment, and comment phases of the planning process. Areas of concern are addressed in the plan and will be mitigated following NRCS protocol to avoid controversy.

Issues to be Resolved	None
Evidence of Unusual Congressional or Local Interest	None
Compliance	Is this report in compliance with executive orders, public laws, and other statutes governing the formulation of water resource projects? Yes __X__ No_____

1. Introduction

Although the Southeast receives more annual rainfall than most of the United States (U.S.), it is still subject to periodic droughts, making the rainfall distribution throughout the year non-ideal for agricultural production (Limaye et al., 2004). Agriculture in the Choctawhatchee-Pea Basin (henceforth referred to as *Choc-Pea*) is further impacted because of relatively poor water holding soils and lack of widespread irrigation, leading to increased financial risk for farmers and impacts to the environment (see Section 3.1 in Appendix D). As a result, this basin has been considerably impacted by drought and the agricultural community has suffered significantly.

Farmers in the project area, as well as throughout Alabama, experience either annual or seasonal periods of severe drought. These periods of drought negatively impact the ability of farmers to produce crops in a sustainable manner. Farmers commit their land, labor and resources to producing a crop and face unreasonable risk due to a lack of precipitation. Without the ability to irrigate, they leave one of the most critical plant growth variables (i.e. soil moisture) to chance. Even simple conservation practices, like no-till and cover crops, can provide limited protection from drought. Improved soils may allow a crop to survive 3 additional days without rain, but droughts often last longer. This region experiences “flash droughts” with no precipitation and high temperatures that may last between 7 and 14 days. A period this long without adequate soil moisture can lead to a complete crop loss.

Annual precipitation rates over 50 inches can provide the illusion of ample water, but the variability of precipitation during the growing season (March – July) and water lost due to evapotranspiration

causes unsustainable damage during critical stages of growth. For example, the month of June is a critical growth period for corn crops because it is the beginning of the silking stage for corn, which directly influences kernel weight and number. As corn is very sensitive during this time and can be directly compromised by factors such as drought and extreme heat, overall plant health can be predicted by looking at the amount of precipitation and evapotranspiration during the month of June. If evapotranspiration is greater than the amount of precipitation, there is a precipitation deficit and rainfed crops may become stressed due to inadequate precipitation.

While farmers may be successful in producing a sustainable crop in some years without irrigation, the long-term data reveal that low (or failed) rainfed crop yields are not sustainable. The sustainable yield threshold for corn is about 109 bushels per acre. This was calculated by averaging the USDA ERS break-even yields for all costs and variable costs. Below this threshold, farmers are considered to be in a production deficit since the commitment of land, labor, and resources are impaired or even lost for the growing season. In Figure 1-1, June precipitation minus evapotranspiration averages were compared to corn crop yields in the Choc-Pea Basin over a period of 54 years. In 23 of the 54 years, farmers had yields below 109 bu/acre (production deficit). Of those 23 years, June had a precipitation deficit 39 percent of the time correlating to low yields. This analysis is described in more detail in Appendix D.1 Section 3.1.1.

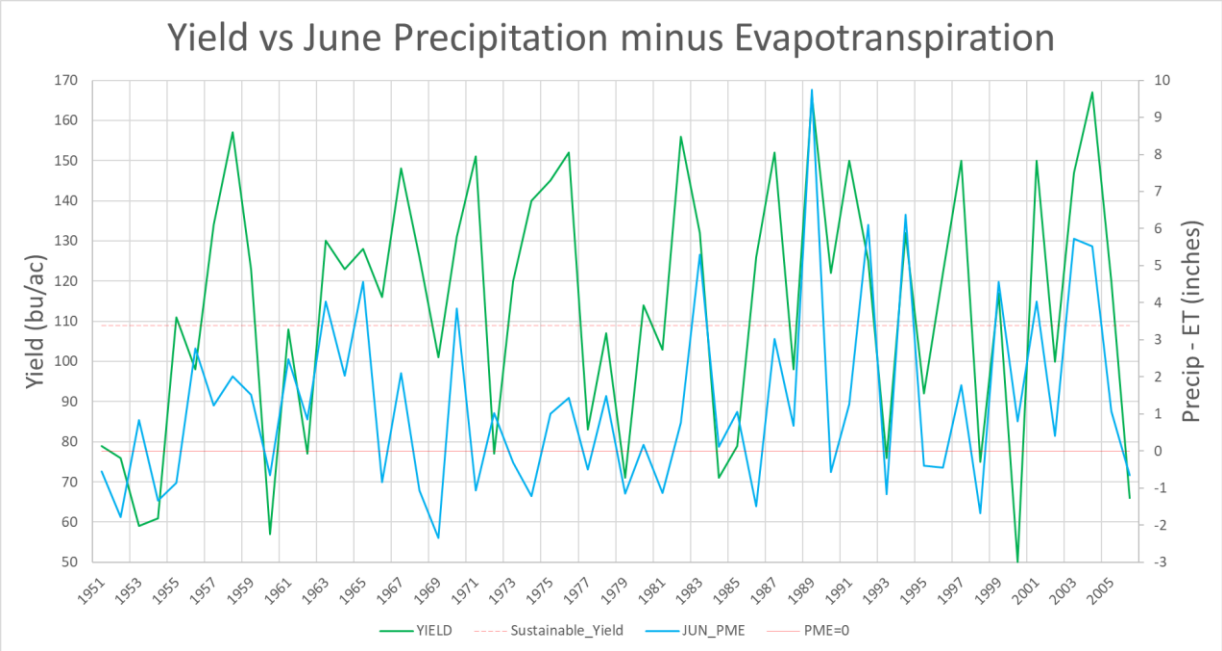

Figure 1-1: Historical Corn Yields and June Precipitation Minus Evapotranspiration (PME) for Headland, AL (1951 – 2006)

As equally important as sustainable crop yields, irrigation has significant impacts on soil health and water quality. A crop that does not mature properly due to lack of moisture does not uptake nutrients, contributing to residual nutrients to be lost to surface or groundwater during rains. Additionally, a crop that does not mature reduces the amount of organic matter available for incorporation into the soil. Organic matter is linked to improved soil nutrient and moisture levels mitigating production loss. Irrigated crops have been shown to have better nutrient use efficiency, especially in times of drought or in critical growth stages where rainfall is limited (see Ellenburg, 2011 for a review).

The area of the Choc-Pea that exists within the State boundary encompasses portions of Barbour, Bullock, Coffee, Covington, Dale, Geneva, Henry, Houston, and Pike Counties in the Southeastern region of Alabama (AL). The Choc-Pea Basin encompasses one of the largest agricultural producing regions in Alabama, historically and presently. Not only is this area ranked second in the state for the value of livestock and poultry products sold, but it is also ranked first in the state for market value of agricultural crop products sold. Row crop agriculture is a dominant source of income for the area.

Due to the widespread need for reduced damage to crops that is translated as agricultural production losses, considerations of water quality, and improvements in soil health, the development and management of water resources for agricultural uses in this basin is needed. The Alabama Natural Resources Conservation Service (NRCS-AL) is working with the SLO, Alabama Soil and Water Conservation Committee (ASWCC), to allocate Public Law 83-566, "Watershed Protection and Flood Prevention Act" (henceforth referred to as *PL-566*), funding to support this ongoing need.

Resource information and obstacles within this basin have been investigated before, resulting in several other publications. These major sources of information include, but are not limited to, a Water Management Plan (2015) published by the Choctawhatchee, Pea, Yellow River Watershed Management Authority (CPYRWMA), a Water Resource Assessment published by the Geological Survey of Alabama (GSA), and a Water Quality Evaluation (2010), also performed by the GSA. The detail and findings outlined in these analyses guide how information is presented in this Watershed Plan. Furthermore, coordination with these authors/agencies has been achieved and will continue during the planning process.

1.1 Decision Framework

This Watershed Plan-Environmental Assessment (Plan-EA) has been prepared to assess and disclose the potential effects of the proposed action. The Plan-EA is required to request federal funding through the Watershed Protection and Flood Prevention Program, Public Law 83-566, authorized by Congress in 1954. This program is managed by the U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS). Through this program, NRCS provides technical and financial assistance to project sponsors such as states, local governments, and Tribes to plan and implement authorized watershed project plans. The authorized purposes for these plans include watershed protection, flood mitigation, water quality improvements, soil erosion reduction, hydropower, irrigation, water management, sediment control, fish and wildlife enhancement, and

rural, municipal, and industrial water supply. As the lead federal agency for this Plan-EA, NRCS is responsible for review and issuance of a decision in accordance with the National Environmental Policy Act (NEPA). NEPA requires that Environmental Impact Statements (EISs) are completed for projects using federal funds that significantly affect the quality of the human and natural environment (individually or cumulatively). When a proposed project is not likely to result in significant impacts requiring an EIS, but the activity has not been categorically excluded from NEPA, an agency can prepare an EA to assist them in determining whether an EIS is needed (see 40 Code of Federal Regulations [CFR] 1501.4 and 1508.9; 7 CFR 650.8). For purposes of NEPA compliance, the intent of this Plan-EA is to provide a programmatic platform for the implementation of the proposed action. The ASWCC partnered with NRCS to implement the Sustainable Irrigation Expansion Project within the Choctawhatchee-Pea River Watershed Planning Area under the watershed authority of the PL-566 program. Tiering is a staged approach to NEPA as described in the Council on Environmental Quality's Regulations for Implementing the Procedural Provisions of NEPA (40 CFR 1500 to 1508). Broad programs and issues are described in initial analyses, while site-specific proposals and impacts are described in subsequent site-specific studies. The tiered process permits the lead agency to focus on issues that are ripe for decision and exclude from consideration issues already decided or not yet ripe. Tiering eliminates repetitive discussions of the same issues across site specific project groups through incorporation by reference to the general discussions. NRCS has determined the need for a Plan-EA to implement the proposed action under PL-566 watershed authority. Due to the broad spatial scale of this analysis and the multi-year project group approach, this Plan-EA does not identify the specific details associated with the engineering design and construction activities that would be required to implement the proposed action. Instead, this document intends to present an analysis in enough detail to allow implementation of a proposed action within the designated project area with minimal additional NEPA analysis.

Consistent with the tiering process as described above, before implementing each site-specific project, an onsite Environmental Evaluation (EE) review would occur using Form NRCS-CPA-52, the Environmental Evaluation Worksheet. The EE process would determine if that project site meets applicable project specifications, and whether the site-specific environmental effects are consistent with those as described and developed in this Plan-EA. This process provides information for the Responsible Federal Official to determine if the proposed action has been adequately analyzed, and if the conditions and environmental effects described in the Plan-EA are still valid. Where the impacts of the narrower project-specific action are adequately identified and analyzed in the broader NEPA document, no further analysis would occur, and the Plan-EA would be used for purposes of the pending action.

A separate site-specific supplemental EA would be prepared if it is determined that the Plan-EA is not sufficiently comprehensive, is not adequate to support further decisions, or if resource concerns or effects have not been adequately evaluated through the programmatic approach.

This Plan-EA has been prepared in accordance with applicable Council on Environmental Quality's regulations for implementing NEPA (40 CFR 1500–1508), USDA's NEPA regulations (7 CFR Part 650), NRCS Title 190 General Manual Part 410, and NRCS' National Environmental Compliance Handbook Title 190 Part 610 (May 2016). The Plan-EA also meets the NRCS program policy of the

2015 NRCS National Watershed Program Manual (NWPM) and guidance of the 2014 NRCS National Watershed Program Handbook (NWPH). This Plan-EA serves to fulfill the NEPA and NRCS environmental review requirements for the proposed action.

2. Purpose and Need for Action

The purpose of this project is to minimize damage to plant health and vigor, improve soil health, and protect basin water quality, all of which are resources of concern associated with rainfed farming in Alabama. Climate change projections vary from more precipitation arriving in extreme, less frequent storms to less precipitation accompanied by increased temperatures. The uncertainty of climate model predictions supports the need for a reliable source of water, as risks to land, labor, and resources may occur.

This project is needed to address untimely and inadequate precipitation, which results in less biomass development and impacts to plant health and vigor. Reduced biomass limits the incorporation of critical organic matter into the soil, reducing soil health. Nutrient use efficiency is decreased when plant health and vigor is impacted, which increases nutrients available for export. By developing diffuse or decentralized on-farm irrigation systems suitable for the farming practices in the Choc-Pea, resilience of the agricultural resources of concern is enhanced and the risk of damages can be greatly reduced.

The project would be developed such that it adheres to State and Federal law and sustainably uses water systems. Implementation of the proposed action would satisfy the PL-566 Authorized Project Purpose, Agricultural Water Management (AWM), through irrigation and agricultural water supply for the benefit of local landowners and communities.

2.1 Project Basin Problems and Resource Concerns

Water Supply Reliability

The Choc-Pea Basin has been impacted physically and economically by periodic droughts, uneven annual rainfall distribution, and relatively poor water holding soils with a lack of widespread irrigation. The growing season, defined as March – July, correlates with the highest maximum temperatures and lowest minimum precipitation values experienced in this region of Alabama. Thus, significant evapotranspiration (ET) occurs, and prime, rainfed agricultural cropland suffers. In addition, climate change creates greater uncertainty for this region. Models predict potential increase intensity in precipitation with longer dry periods, which could drastically impact rainfed crops. Irrigation helps protect crops from damages to plant health and vigor resulting from inadequate precipitation, as well as benefiting soil health and water quality. A crop that does not mature properly due to lack of moisture does not uptake nutrients, which allows residual nutrients to be lost to surface or groundwater during rains. Additionally, a crop that does not mature reduces the amount of organic content available for incorporation into the soil. Loss of organic matter negatively influence soil nutrient and moisture levels that may further exacerbate production loss. The need for irrigation is

expected to increase as the demand to feed a growing population continues. Therefore, the need to sustainably increase on-farm irrigation exists and must be addressed to ensure that farmers in this basin may manage drought stresses effectively and bolster the resilience of U.S. agricultural productivity in the uncertainty of climate variability.

Alabama crops contribute at least $5.9 billion to the state's economy every year (NCIS, 2019). As one of the most concentrated row crop producing areas in Alabama, federally supporting this basin's agricultural production and land use would be a wise investment for the U.S. agricultural industry. According to a review of the agricultural land use trends from 2012-2017, an average of 12 percent decrease in the number of farms and an approximate 15 percent average decrease in farmland acreage occurred within the nine counties overlapping the basin area (USDA, 2019). Additionally, Houston and Coffee Counties are currently listed in the top 15 fastest growing counties by population in Alabama (U.S. Census Bureau, 2020). Although much of the basin is considered as Alabama's prime agricultural land, it is likely that the current land use and ownership patterns may change to favor developed land over agricultural land. However, converting dry land to irrigated land in Alabama increases the average cash rent per acre from approximately $55 to $121 (USDA NASS, 2017), which may serve as an incentive for landlords who rent farmland to retain agricultural uses.

While not a primary focus, crop insurance information provides insight into the risk of production loss that farmers face in this basin. Alabama crop insurers paid $46 million in 2018 to cover crop losses (NCIS, 2019). The average crop insurance indemnities for crop losses occurring within the Choc-Pea Basin between the years 2007 and November 11, 2019 were equal to $12,036,923 (USDA, n.d.). These crop insurance claims were primarily associated with drought and unfavorable climate conditions during the growing season in this basin. Furthermore, the anticipated reduction of both crop insurance dependency and the risk of crop losses, as well as an increase in financial security during times of need, may incentivize farmers to retain land ownership and continue agricultural production. However, only existing agricultural land is eligible for this project and, therefore, the land use in this area is not expected to change. Although Federal support of the existing agricultural production in this basin may incentivize farmers to continue providing a reliable food source needed for the future, potential land use changes are not a goal of the project and are not expanded upon in detail within this Plan-EA.

3. Scope of the Plan-EA

The purpose of scoping is to identify issues, concerns, and potential effects that require detailed analysis. Using the input obtained during the scoping process, the project was refined to focus on relevant resource concerns and issues and to eliminate minor or irrelevant issues from the further in-depth study. Relevant resource concerns are carried forward for further detailed research and discussion.

The scoping process followed the general procedures per NRCS guidance and PL-566 requirements. Both NRCS procedures and NEPA regulations (40 CFR 1500-1508) require that the NRCS begin scoping early in the planning process. The NRCS, as the lead federal agency, has initiated NEPA

analysis in the form of a Plan-EA to analyze impacts to the natural and human environment from this project.

3.1 Pre-Scoping

The scoping process began in 2015 with a statewide survey conducted by cooperating agencies, Alabama Farmers Federation (ALFA) and the Alabama Association of Conservation Districts (AACD), to gauge interest and assess participation in this program. The survey provided a scoping platform to gain information on current irrigation use, barriers to irrigation adoption, farmer interest in a cost-share program, and preferred conservation practices.

There was a total of 263 responses to the survey. As shown in Figure 3-1, the highest survey participation occurred in Dallas, Limestone, and Chilton Counties, and the lowest participation occurred in Winston, Wilcox, and Walker Counties. Approximately 69 percent of survey respondents listed "Economics" as their primary barrier to irrigation, followed by Access to Water with 28 percent (Figure 3-2). When asked how much cost-share farmers were willing to match for irrigation, 38 percent of respondents said they would invest up to 50 percent of the total cost (Figure 3-3). Only eight percent of respondents said they would invest in irrigation regardless of the funding offered.

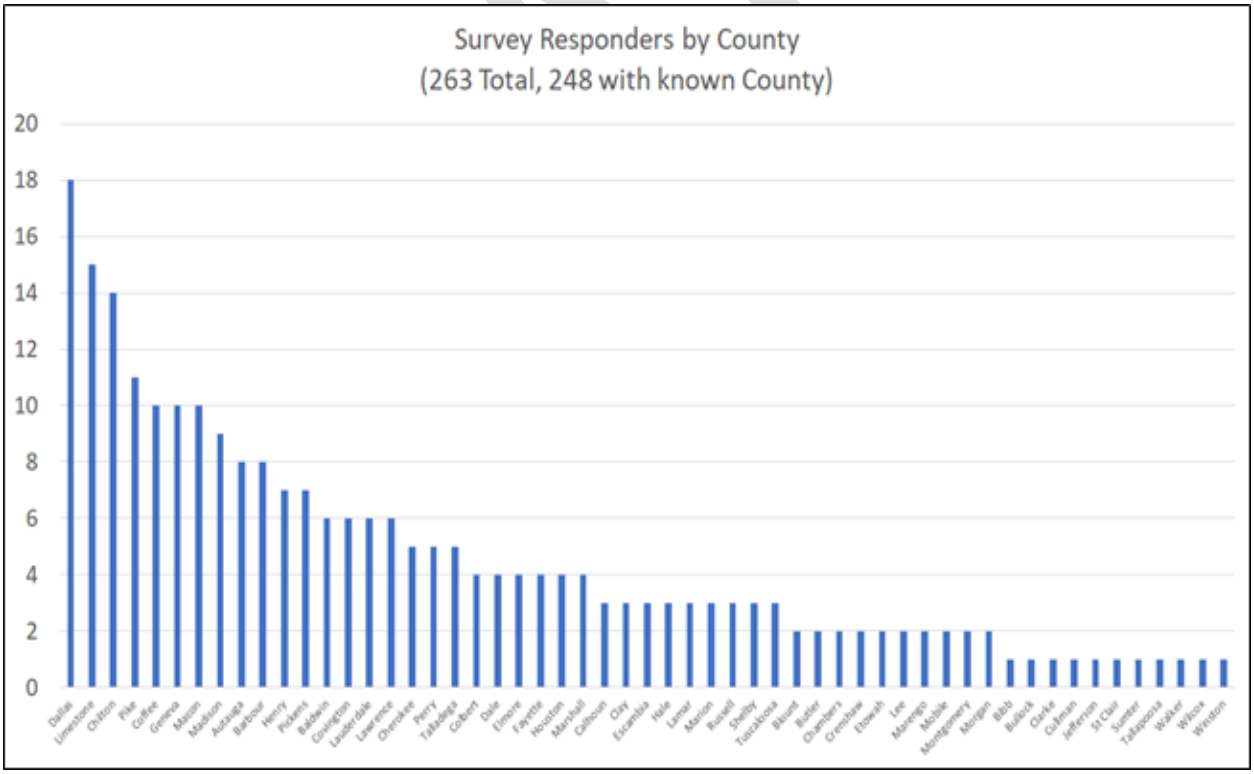

Figure 3-1: ALFA Survey Respondent Count

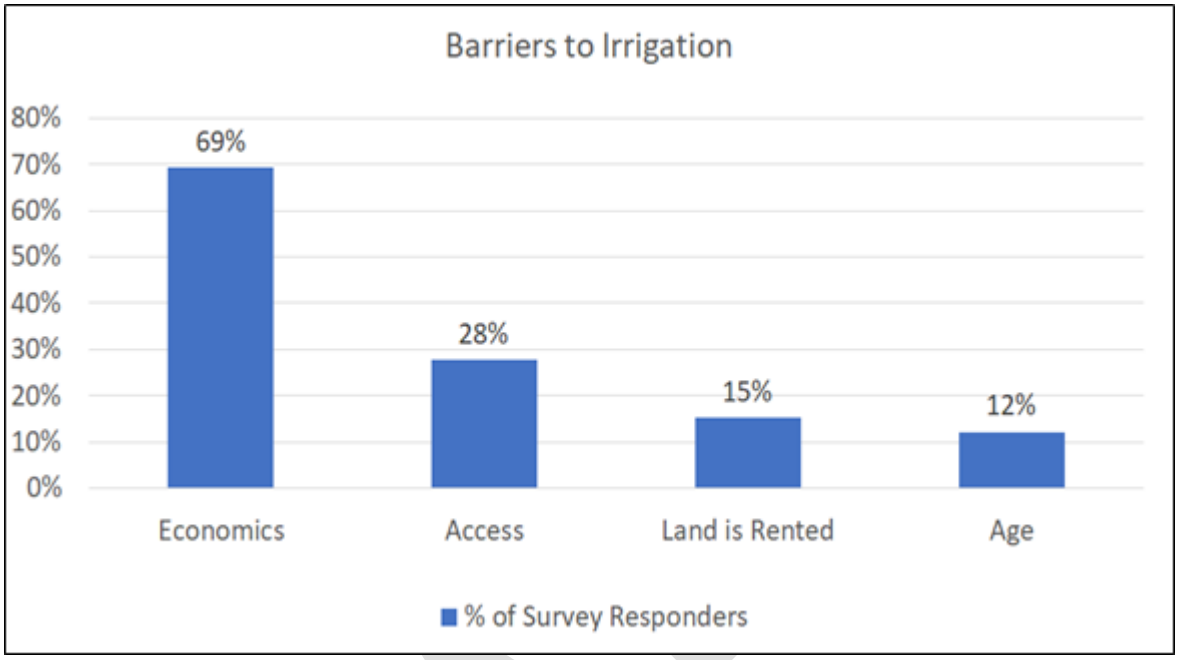

Figure 3-2: ALFA Survey - Barrier to Irrigation

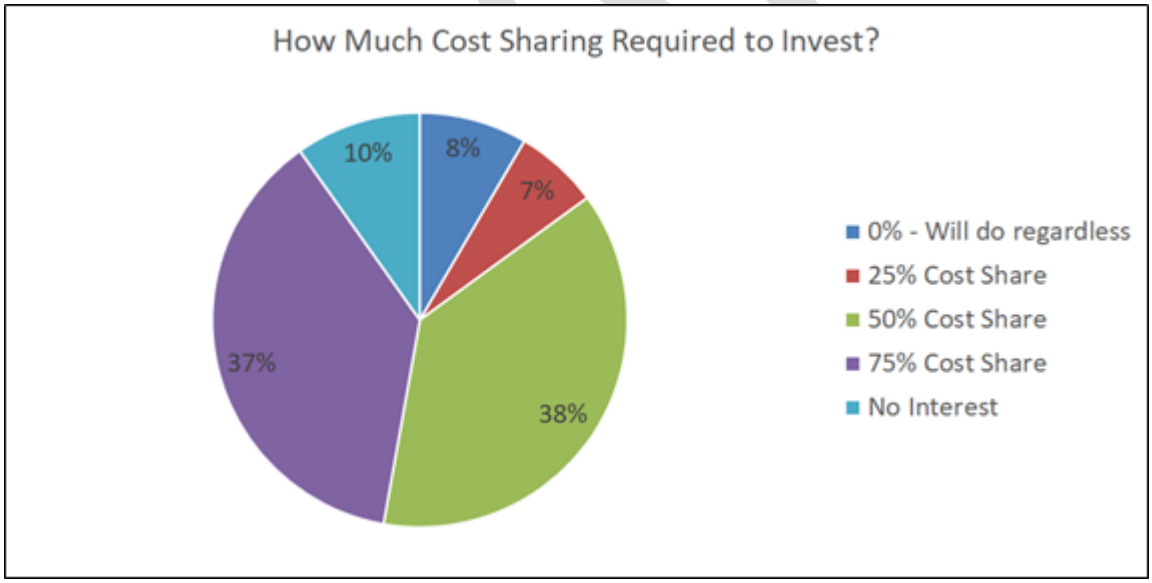

Figure 3-3: ALFA Survey - Cost-share Percent Desired to Invest in New Irrigation

In September 2018, a Statewide Resource Assessment (SRA) was completed to assess variables such as the areas with considerable water resource concerns, areas of maximum potential for project success, and areas with considerable agricultural land use. The National Water Management Center

(NWMC) recommended data layers for inclusion in the SRA (Appendix D, Table D-20). Sources and information for these data layers were then identified and acquired through coordination with Federal and State agencies and universities. Throughout SRA development, meetings were held with non-governmental organizations (NGOs) and government agencies to receive comments, address concerns, and provide information and details regarding the scoping process.

To further the scoping process, a statewide stakeholder steering committee meeting was held on September 19, 2018, at the ALFA Insurance Service Center Office (2108 E. South Blvd, Montgomery, AL). Presenters at the meeting included Mr. Ben Malone, AL NRCS State Conservationist; Mr. Cameron Handyside, University of Alabama Huntsville (UAH); Dr. Eve Brantley, Auburn University (AU); and Dr. William Puckett, ASWCC Executive Director. The presentations covered the proposed financial assistance available through PL-566, the project purpose and need, the Watershed Plan-EA process, the draft SRA, and opportunities for further cooperating agencies' participation. Questions and comments were discussed throughout the meeting. A total of 15 cooperating agency representatives attended the meeting, excluding staff from NRCS, ASWCC, UAH, and AU.

Apart from the initial project scoping process, the NRCS, ASWCC, and the AU and UAH technical team conducted public scoping as the NEPA review process proceeded. The scoping process followed the general procedures consistent with NRCS guidance and PL- 566 requirements. Both NRCS procedures and NEPA regulations (40 CFR 1500 to 1508) require that NRCS use scoping early in the planning process to identify issues, concerns, and potential effects that require detailed analysis. Using input obtained during scoping, NRCS refined the project to focus on relevant resource concerns and issues. Also, concerns and issues that were found not to be relevant to the project were eliminated from further detailed study. Following this scoping process, a Watershed Plan-EA is drafted to determine if the proposed project meets the criteria found in Title 390, National Watershed Program Manual, Part 500, Subpart A, Sections 500.3 and 500.4. Relevant resource concerns will be carried forward for further study and discussion. The technical team and NRCS organized a series of agency and public scoping meetings to seek additional issues of economic, environmental, cultural, and social importance in the basin, and provide an opportunity to review and evaluate project alternatives, express concerns, and attain further project information.

3.2 Agency, Tribal, and Non-Governmental Outreach

The NRCS-AL ensures compliance and consultation with Tribal Governments regarding natural and other resource concerns per Executive Order 13007, Executive Order 13175, Secretarial Order 3206, and Presidential Memoranda (April 29, 1994, and November 5, 2009). To ensure that Tribal concerns are considered and that any cultural and historic resources of significance to Indian Tribes are properly identified and assessed, Tribal consultation is being conducted under Section 306108 (or "Section 106") of the National Historic Preservation Act (NHPA) of 1966 (recodified at PL 89-665, 54 U.S.C. 306101 et seq.) and its implementing regulations at 36 CFR Part 800, along with Executive Order 13175, Secretarial Order 3206, NRCS Title 390, National Watershed Program Handbook (NWPH, see Part 601 Subpart A Section 601.1-601.3), NRCS Title 190, National Cultural

Resources Procedures Handbook [NCRPH, see Part 601, Subpart C, Section 601.21(E)(2)], NRCS Title 410, General Manual (GM, see Part 405 Subpart A), ad NRCS Title 190, National Instruction (NI, see Part 315) NRCS-AL State Conservationist (STC), Ben Malone, is sending letters to Tribal Governments and Tribal Historic Preservation Officers (THPOs) with a copy of this Draft Watershed Plan-EA to provide the opportunity to identify any areas of concern they may have within the basin. Tribal Governments and THPOs can advise and assist NRCS-AL in identifying and evaluating any historic properties, including those of traditional religious or cultural importance (see also 54 U.S.C. Section 302706). The relevant/local Tribes that will receive a copy of this Draft Plan-EA and primarily consulted with include the following:

- Absentee-Shawnee Tribe of Oklahoma
- Alabama-Coushatta Tribe of Texas
- Alabama-Quassarte Tribal Town
- Cherokee Nation
- Chickasaw Nation
- Choctaw Nation of Oklahoma
- Coushatta Tribe of Louisiana
- Eastern Band of Cherokee Indians
- Eastern Shawnee Tribe of Oklahoma
- Jena Band of Choctaw Indians
- Kialegee Tribal Town
- Miccosukee Tribe of Indians of Florida
- Mississippi Band of Choctaw Indians
- Muscogee (Creek) Nation of Oklahoma
- Poarch Band of Creek Indians
- Seminole Nation of Oklahoma
- Seminole Tribe of Florida
- Shawnee Tribe
- Thlopthlocco Tribal Town
- United Keetoowah Band of Cherokee Indians

A meeting with the Choc-Pea Basin's NRCS District Conservationists was held on July 11, 2019 in Coffee County. This meeting identified potentially successful alternatives to meet the needs of this basin, potential resource concerns, and specific agencies to invite for cooperation throughout the planning process.

A scoping meeting comprising State, Federal, and NGO representatives took place on September 9, 2018 in Montgomery, AL. Attendees discussed the planning process and potential resource concerns and provided feedback and suggestions on the SRA. After the Choc-Pea Basin was selected for scoping, Federal, State, and NGO representatives were invited to meet on October 30, 2019 in Montgomery, AL. See Table 3-1 for an outline of the agency coordination and consultation that took place during this time. Additional partner agency meetings were scheduled if requested or needed for further information.

Table 3-1. Agency and NGO Coordination during Scoping Process

DATE	LOCATION	ATTENDEES		PURPOSE
		Organization	Name	
July 11, 2019	New Brockton, AL	ASWCC	Bill Puckett	To discuss resources, farmer needs, and potential challenges within the basin as part of the scoping process. Also, to share program information and hear from the local District Conservationists on what they see and recommend in this area.
		SWCD-Covington	Patricia Gunter	
		ASWCC	Ashley Henderson	
		SWCD-Covington	Allison O'Neal	
		NRCS-East AL	Richard Collier	
		SWCD-Dale	Dawn Peters	
		SWCD-Dale/Henry	Adam Sconyers	
		SWCD-Coffee	Dorris Skipper	
		NRCS-Coffee/ Covington	Josh Elliot	
		SWCD-Pike	Jennifer Williams	
		NRCS-AL	Jeff Thurmond	
		NRCS-AL	Shannon Weaver	
		NRCS-Crenshaw	Beth Chastain	
		SWCD-Russell	Karron Passmore	

Table 3-1. Agency and NGO Coordination during Scoping Process

DATE	LOCATION	ATTENDEES		PURPOSE
		Organization	Name	
		SWCD-Crenshaw	Jessica Jones	
		SWCD-Barbour	Carol Threatt	
		AU/ACES	Rachel Kuntz	
		AU/ACES	Bethanie Hartzog	
		UAH	Cameron Handyside	
October 18, 2019	Tuscaloosa, AL	GSA	Greg Guthrie	To review and discuss groundwater resources and potential issues in the Choc-Pea Basin.
		AU	Eve Brantley	
		AU	Rachel Kuntz	
		UAH	Cameron Handyside	
		ASWCC	Ashley Henderson	
		AACD	Sabra Sutton	
		ASWCC	Bernice Mays-Butler	
		NRCS-AL	Bill Smith	
		NRCS-AL	Vernon Abney	
		UAH	Krel Haynes	
		UAH	Jonathan Beeson	
October 30, 2019	Montgomery, AL	ASWCC	Bill Puckett	Partner Agency Scoping Meeting to identify concerns and available data.
		ASWCC	Ashley Henderson	
		NRCS-AL	Vernon Abney	
		AU/ACES	Eve Brantley	
		AU/ACES	Rachel Kuntz	
		AU/ACES	Bethanie Hartzog	

Table 3-1. Agency and NGO Coordination during Scoping Process

DATE	LOCATION	ATTENDEES		PURPOSE
		Organization	Name	
		UAH	Cameron Handyside	
		AU/ACES	Laura Bell	
		SWCD	Dorris Skipper	
		NRCS	Josh Elloitt	
		NRCS	Annie Blankenship	
		CPYRWMA	Barbara Gibson	
		NRCS	John Curtis	
		ADECA-OWR	Tom Littlepage	
		ADECA-OWR	Brian Atkins	
		USFWS	Jennifer Grunewald	
		NRCS	Vernon Abney	
		GSA	Greg Guthrie	
		SWCD	Marrissa Chancy	
		SWCD	Colleen Lewis	
		ADEM	Chris Johnson	
		City of Dothan	Lindsey McDonald	
		Cook Hydrogeology	Marlon Cook	
		City of Dothan	Henry Mosley	
		NRCS	David Adams	
		GSA	Stuart McGregor	
		Choctawhatchee RiverKeeper	Michael Mullen	

Table 3-1. Agency and NGO Coordination during Scoping Process

DATE	LOCATION	ATTENDEES		PURPOSE
		Organization	**Name**	
		NRCS	Alex Vaughan	
		AHC	Amanda McBride	
		AHC	Eric Sipes	
		NRCS	Ben Malone	
		ADAI	Bob Plaster	
		ALFA	Mitt Walker	
		TNC	Mitch Reid	
		GSA	Ann Arnold	
		UAH	Maury Estes	
		UAH	Krel Haynes	
		UAH	Jonathan Beeson	
		UAH	Lucia	
		UAH	Kevin Doty	
December 17, 2019		CPYRWMA	Barbara Gibson	A meeting with the CPYRWMA for further discussion and consultation regarding the Choc-Pea planning process and details.
		AU/ACES	Eve Brantley	
		UAH	Cameron Handyside	
		AU/ACES	Rachel Kuntz	
		ASWCC	Bill Puckett	
		AACD	Sabra Sutton	
		Cook Hydrogeology	Marlon Cook	
		ASWCC	Ashley Henderson	
		NRCS	Steve Musser	

Table 3-1. Agency and NGO Coordination during Scoping Process

DATE	LOCATION	ATTENDEES		PURPOSE
		Organization	Name	
		NRCS	Vernon Abney	
		NRCS-AL	Bill Smith	
		NRCS	Perry Oakes	
		NRCS-AL	Shannon Weaver	
		AU	Sara Bolds	

Table 3-2. Public Coordination during Scoping Process

DATE	LOCATION	ATTENDEES		PURPOSE
		Organization	**Name**	
December 18, 2018	Hartford, AL	ASWCC	Bill Puckett	To scope farmer interest and agricultural needs in the Choc-Pea Basin.
		ASWCC	Ashley Henderson	
		AU/ACES	Eve Brantley	
		AU/ACES	Rachel Kuntz	
		UAH	Cameron Handyside	
		NRCS-AL	Vernon Abney	
		N/A	Jered Mather	
		NRCS-AL	Chris Mead	
		N/A	Bill Godwin	
		NRCS- AL	Richard Collier	
		ASWCC	J.O. Norris	
		Wiregrass Electric	Brad Kimbro	
		NRCS-AL	Brandon McCray	
		SWCD- Houston County	Glenda Yohn	
		State Comm.	Johnny Lee	
		SWCD- Dale and Henry County	Adam Sconyers	
		SWCD- Geneva County	Marissa Chancy	
		SWCD- Geneva and Houston County	Alex Vaughan	
		SWCD- Geneva County	Colleen Lewis	
		Valley Irrigation	Doug Parrish	
		N/A	Winton Fulford	

		ACES-AU	Brandon Dillard	
		ACES-AU	William Birdsong	
		N/A	Ronnie Hales	
		N/A	Jason Greene	
		Tuskegee University	Barrett Vaughan	
		Tuskegee University	Miles Robinson	
		ACES-AU	Kris Balkcom	
		N/A	Thomas Turner	
		Coast Pump	Jason Musgrove	
		Coast Pump	N/A	
		N/A	Clint Patterson	
		N/A	David Adams	
		Congresswoman Martha Roby, Field Representative	Cindy Pate	
		Valmont Industries	Sid Cameron	
		SWCD- Coffee County	Dorris Skipper	
		Wiregrass Gin Co.	Allen Barrentine	
		N/A	Chad Barrentine	
		N/A	Garrett Shinner	
		N/A	Joey G.	
		N/A	Chris S.	
		N/A	Steve Ingram	
		Congressman Aderholt Field Representative	James Manasco	
		N/A	Donnice Ward	
		Farmer	Shaun Carpenter	

		N/A	Bobby Edmonds	
		NRCS-AL	Josh Elliott	
		Farmer	Logan Shirah	
		Hilton Cooper Contracting Co.	Justin Cooper	
		Hilton Cooper Contracting Co.	Kendall Cooper	
		N/A	Terry Adams	
		N/A	Steve Brannon	
		Farmer	Clay Wise	
		N/A	Walt Waldin	
		N/A	Jim Lewey	
		N/A	Max Bozoman	
		N/A	Scotty Farmer	
		ALFA	Brian Hardin	
		N/A	Robert M.	
		N/A	Johnny Reynolds	
		N/A	Josh Barbouree	
		Farmer	Andy Sumblin	
		N/A	Todd Brannon	
		ACES-AU	Brenda Ortiz	
		NRSC-AL	John Curtis	
		N/A	Bob Helms	
		First South Farm Credit	Donald Davis	
		N/A	Steve Dunn	
		N/A	Chock Bright	

		N/A	Danny McNeil	
		Ward Peanuts	Kevin Ward	
		N/A	Caleb Briston	
		N/A	Bobby Crutchfield	
		N/A	Jim Waite	
		N/A	Troy Fillingin	
		N/A	Cindi Fair	
August 20, 2019	Enterprise, AL	NRCS-AL	Vernon Abney	
		AU/ACES	Rachel Kuntz	
		AU/ACES	Eve Brantley	
		UAH	Cameron Handyside	
		NRCS-AL	Bill Smith	
		ASWCC	Ashley Henderson	
		ASWCC	Bill Puckett	
		Lender/Sponsor	Micah Garrett	
		Lender/Sponsor	Lee Childers	
		Farmer	Johnny Mack Hollis	
		Sponsor	Cindy Kinney	
		Ag Spray	John Hollis	
		Lender	Micheal McLaney	
		Lender	Marshall Childers	
		Farmer	Logan Shirah	
		Farmer	Keith Shirah	
		Farmer	Johnny Reynold	
		Farmer	James Stephens	
		Farmer	J. Allen	

		Farmer	Clint Patterson	
		Biologist	Roger Manguam	
		N/A	Ronnie Hales	
		ALFA	Hunter McBrayer	
		Farmer	Jim Levey	
		Reinke	Michael Mills	
		Farmer	CW Hartzog	
		N/A	Todd Hicks	
		CPYRWA Board	Josh Carnley	
		Farmer	Todd Brannon	
		Farmer	Noel Danner	
		Farmer	Chris Beaty	
		Farmer	Jim Waite	
		Farmer	James Martin	
		Farmer	Bobby Edmondson	
		Farmer	Dan Stokes	
		First South Farm Credit	Denson Helms	
		NRCS	Kaitlyn McCurdy	
		Farmer	Garrett Skinner	
		T-L Irrigation	Daniel Harpe	
		Farmer	Robert Skinner	
		Farmer	Glen Powell	
		Farmer	Joe Powell Jr.	
		Landowner	Gary Cox	
		Farmer	Kevin Ward	
		Farmer	Joe Powell	

		Farmer	Frank Albright	
		Farmer	Terry Carpenter	
		Farmer	Anthony Carpenter	
		Farmer	Stacy Sandars	
		Farmer	Jeremy Brown	
		Farmer	Robert Revels	
		Sponsor	Randall Kyles	
		OWR	Michael Harper	
		OWR	Shae Holley	
		Farmer	Jonathan Sanders	
		Farmer	Lewie Helms	
		Donald Smith Company	Matt Singletary	
		ALFA	Mitt Walker	
		Farmer	Nigel Wells	
		Owner	Rickey Wilks	
		Owner	Chris Day	
		Owner	Clay Wise	
		N/A	Jo Michael Rich	
		N/A	Rogon Dale Kirkland	
		Coffee County SWCD	Anthony Reeves	
		NRCS	Josh Elliot	
		ALFA	Carla Harnady	
		AACD	Courtney Senth	
		Farmer	Walt Wold	
		Farmer	Thomas Kirkland	
		N/A	Dorris Skipper	

		NRCS	Steve Musser	
		AACD	Sabra Sutton	
November 6, 2019	Ozark, AL	AU/ACES	Eve Brantley	Public Meeting
		AU/ACES	Rachel Kuntz	
		AU/ACES	Laura Bell	
		ASWCC	Bill Puckett	
		ASWCC	Ashley Henderson	
		SWCD	Dawn Peters	
		NRCS-AL	Vernon Abney	
		NRCS-AL	Andrew Green	
		Cook Hydrogeology	Marlon Cook	
		NRCS & Farmer	Adam Sconyers	

3.3 Public Outreach

During the Farmer Scoping meeting held on August 20th, 2019, a survey was conducted to receive farmer's feedback related to their irrigation and on-farm needs. Approximately 41 respondents completed and returned their surveys. To summarize, the following information was gathered:

- Thirty-five respondents ranked the need for irrigation on their farm or in their county a "10" (extreme need); three respondents ranked it a "9" and three ranked it an "8". Zero respondents ranked the need for local irrigation below "8". Overall, 85 percent of respondents see extreme need for irrigation on their farm or in their county. Respondents provided reasoning for how they ranked the need for irrigation in the following statements: "*Recurrence of drought"; "Competition with Georgia"; "Improve crop production"; "Stability"; "Better production"; "Sandy soils"; "Necessary to survive farming"; "No rain"; "Low CEC soils cannot buffer low rainfall in growing season"; "Lack of irrigation"; "Insurance premium cuts, profit margins too close, diversified crops"; "Peace of mind"; "Reduce risk, increase production, minimize drought impact, increase productivity, and reduce waste.*"
- Seventy-eight percent of the respondents ranked their concern about irrigation in their area a "10", equaling "very concerned." Respondents who chose "10" provided the following

statements as reasoning behind their choices: "*Need for flexibility in crop rotation and practice in low commodity price environment"; "Even though the need is great, the cost is too high"; "More stable income for farmers"; "So many farms have quit from dry conditions"; "We need irrigation to help reduce drought impact and help secure farmers in this area"; "We need to compete with other states on yields"; "Irrigation is the future of farming."* Respondents who chose below a "10" importance stated the following reasoning: *"Cost of production of each crop"; "Concerned about pulling too much water out of the Choctawhatchee*." There were no respondents who ranked their concern below a "7".

- Eighty-eight percent of the respondents ranked their interest in expanding irrigation in their area a "10" equaling "extremely interested." Respondents who chose a "10" provided the following statements as reasoning behind their choices: "*I know my fellow farmers in my county have the same need I do"; "it would help greatly with production"; "Less than 1/5 under irrigation"; "Need better productivity"; "More profit*." Respondents who chose either "8" or "9" importance stated the following reasoning: "*Very interested but it's hard to find out what the actual cost or the most efficient route is*." There were no respondents who ranked their interest below an "8".
- Respondents were able to write in needed irrigation equipment/systems. The majority of answers included well development, center pivots, electricity/3-phase power, and storage ponds. Four respondents mentioned the need for efficient and sustainable systems.
- The split majority of respondents noted having access to either a combination of surface water and groundwater or surface water alone.
- Precisely thirty-two people submitted an estimate for how many new acres they would put under irrigation if given funding from this program. The results vary from four acres up to 1,500 acres.

3.4 Scoping Comments

Table 3-3 presents the record of comments received during agency scoping meetings. The comments presented are those made either orally or sent via email from the organization representatives and relate directly to the scoping of the Choc-Pea Basin. Table 3-4 lists comments received during the August 20th, 2019 Farmer Scoping meeting.

Areas of potential conflict identified during the scoping process include the Florida Northwest Water Management Districts (NW FL WMD) and the Choctawhatchee, Pea and Yellow Rivers Water Management Authority (CPYWMA). Coordination meetings with the CPYWMA resolved concerns with this entity. The project will work closely to understand and address potential conflicts with the NW FL WMD.

Table 3-3. Agency Scoping - Comments Received

Name and Affiliation	Comments	Responses
Mitch Reid, The Nature Conservancy	How is the organic soil work that's being done fed into this irrigation project? Is this a ranking piece?	Yes. Demonstrated conservation stewardship and practices that promote soil health are all considered as part of the ranking process. Furthermore, some of our partners with AL Extension have been closely working with farmers in the Wiregrass region and continuously promote soil conservation. We recommend to all the farmers present at the listening meetings for this project to adopt these practices and stewardship principles.
Tom Littlepage, Office of Water Resources	During the survey process in the Middle Tennessee River Basin and the Choc-Pea, how big of an issue was power availability?	In the Middle Tennessee River Basin, almost everyone has 3 phase power, but a few applicants intend to use a generator. In the Choc-Pea Basin, the power may be spottier, and many individuals may have to run 3 phase power.
Tom Littlepage, OWR	I don't see electric/power cooperatives and companies present at this meeting. Why is that?	We have had meetings with AL and Electric Cooperatives. There is some cost-sharing, but it is not great because they want to encourage a time of use, which is not what you need for irrigation. Also, we are looking at phase conversion, meaning you can bring a single phase to a field then transfer to a 3-phase conversion. This is uncommon, but we are trying to expand the effort. Some places already have this conversion.

Table 3-3. Agency Scoping - Comments Received

Name and Affiliation	Comments	Responses
Tom Littlepage, OWR	This program provides individual farm benefit, but regional benefit is also a priority, so is there any coordination with broadband initiative and power cooperatives? Is there something they are aware of that we aren't for providing capability? Clustering farmers within irrigation needs could be helpful for bringing a power provider.	We've had conversations about this, but ultimately "power clustering" cannot be tackled with this program. However, the farmers are motivated to work this out with the electric coops and split costs between each other. Trust me, the farmers will tend to orchestrate themselves to get power.
Mike Mullen, Choctawhatchee Riverkeeper	I would think that if there is an issue with remote power, and this a 'sustainably-focused' initiative, maybe solar is a possibility?	There is nothing restricting farmers from applying for solar power generators. The main issues are getting enough power from it to drive the well, and it is expensive. It's hard to find someone who is doing this and people who are willing to invest in this technology while it is still in the "preliminary" efficiency phase.
Mitch Reid, TNC	TVA may have grants for solar work.	Solar works for small electrical needs, but difficult to get them for larger needs.
Marissa Chancey, SWCD	When does the application process begin? Some farmers are confused about the application openings and deadlines.	We want to leave the applications open and do a push later in the process. There will be a ranking cut-off date then. In all, we are keeping the applications available until after the EA has moved further in the process.

Table 3-3. Agency Scoping - Comments Received

Name and Affiliation	Comments	Responses
Mitch Reid, TNC	Usually when we talk about source water protection zones, we see areas of land affecting surface water, but are you just looking at cones of depression? Couldn't source water protection areas be miles away?	We are looking at surface water protection zones/plans, but also cones of depression and well-head protection plans. We do not want to disturb the area around wells, and we are looking into that. We also need to understand the cone of depression to set a limit and a buffer. We can model source water protection depending on the depth of well, and we want to shape the capture zones where possible.
Mitch Reid, TNC	But couldn't the source water protection be miles away?	ADEM data is based on the depth of screen interval; if less than 600 feet, than your actual protection is higher than 400 feet around the wellhead. If screening deeper than 600 feet, then your protection area is 400 feet around the wellhead. We want to protect the capture zone area around all the wellheads.
Brian Atkins, OWR	Have you contacted Rodney Knight from USGS regarding his work on stream flow at the HUC-12 for Alabama?	Yes, we have reached out to Rodney King and Toby Feaster from the USGS to set up meetings.
N/A	Is having a conservation plan on the farm a requirement for this program?	No, having a conservation plan is not required. However, having a conservation plan gets a farmer more points in the ranking criteria, but they don't have to provide an updated conservation plan. However, an updated nutrient management plan is required.

Table 3-3. Agency Scoping - Comments Received

Name and Affiliation	Comments	Responses
Dorris Skipper, Coffee County SWCD	What happens if people rank the same? How will you choose between applications?	There seems to be a natural 'break' between highly qualified and moderately qualified applications. It worked out that way in the Wheeler. So, if there's 15 that rank at the top, then ideally, we will be able to fund all 15. However, if there's a tie between applications at the natural break line, then we will look at the numbers of acres irrigated and the cost they are requesting. Lower costs will be prioritized in tie breaking.
Tom Littlepage, OWR	Will the questions or the points be different in this basin's ranking criteria?	We don't know yet. Overall, we're mainly looking for evidence of stewardship. Irrigation is a risk management tool, and we want people to put in best practices to improve efficiency.
Ann Arnold, GSA	If you have an applicant who is neighboring an existing user, how do you rank their use? Are you considering if other users will affect existing capture zones?	We are working with GSA to understand aquifer limits. We are working to understand those capture limits to assess mitigation strategies. We're also working with Marlon Cook to help identify those potential issues and possible ways to mitigate those.
Ann Arnold, GSA	Education of existing farmers should be part of this project as well.	The education of existing farmers is included in the theme of our overall watershed approach. ASWCC is working with Extension in the Wiregrass currently on RCPP (Cover crops), precision irrigation/ag outreach and education. There is cost-share money for cover crops covered by that program.

Table 3-3. Agency Scoping - Comments Received

Name and Affiliation	Comments	Responses
Tom Littlepage, OWR	Is any of the ranking criteria focused on social, economic, and cultural values- is this a priority at all?	Underserved farmers are a priority, and we offer a better cost-share rate for those communities. We are offering historically underserved farmers a 65 percent cost-share, and we have a target goal of reaching those underserved communities and farmers. However, this project does not explicitly prioritize the socioeconomic aspects as part of the rankings. We do reach out to underserved farmers to encourage them to apply.
Tom Littlepage, OWR	Tax advantage designated areas of state-may be able to leverage that credit. These should be looked at in congruence with the program.	We will investigate this. Thank you for your comment and suggestion.
Mitch Reid, TNC	There's been talk about the Wiregrass region being nominated as sentinel landscape for Fort Rucker? This may provide opportunities for landowners to keep their land under ag or forestry production. I believe it is a five-county area around Fort Rucker. Could that give you a 'check mark' in your application process?	We will investigate this. These may be DOD funds, but we may have to target that internally. It's under application consideration right now. Not sure if it gives farmers another resource. Maybe DOD has some resources there. I suggest checking with Chuck Sykes from ADCNR and Chairman of the SERPAS.
Dr, Puckett, ASWCC to OWR	When someone reports and says they're using surface water, does that mean I could be using a reservoir into a pond and then use that water?	We would categorize it as surface water.

Table 3-3. Agency Scoping - Comments Received

Name and Affiliation	Comments	Responses
Tom Littlepage, OWR	Are you assuming hydrological variability of rainfall? What about GriDSSAT?	GriDSSAT allows us to calculate crop yield using nutrients, soil, and water availability then gives outputs. In this case, we have 90 years of data in GriDSSAT capturing wet and dry periods of the state. Then we get the average when looking at irrigation demand. The farmers are not putting a statistical dent in the water resources available.
Greg Guthrie, GSA	Is the recharge number net recharge-subtracting evapotranspiration and baseflow? How does groundwater availability factor in?	Yes, we assume no returns are going back into the groundwater. There's a lag time with groundwater and surface water, which is why we assume 100 percent consumption. We don't have enough info to quantify the return of groundwater, so it winds up being looked at as a conservative number. If we could account for it, then we would like to. Therefore, we're asking for data from GSA.
Jennifer Grunewald, USFWS	How many uses are you considering outside of agriculture? Is there a point where the watershed can't handle 10 percent? Is there a trigger that will show you are closer to the yellow than you think you are?	We must understand all other consumption uses of water in the basin. For example, power plants or municipal water use returns a lot. Accurate water balance is a necessity. At the HUC-8 level, we are okay with the numbers. Also, there is previous work done by Dr. Srivastava on instream flows that backs up the general rule of thumb, if we keep irrigation under 10 percent of the HUC-12 watershed, it could be sustainable long term.

Table 3-3. Agency Scoping - Comments Received

Name and Affiliation	Comments	Responses
Greg Guthrie, GSA	Are there any steps to be taken beforehand to go in and establish what baselines are for something like nutrient levels? If you establish baseline nutrient levels, can we look 2 years down the road to see what nutrient levels are? Are the BMP's (best management practices) that we are using effective? Even with shallow groundwater in North Alabama, baseflow is a concern, someone with riparian rights is reducing base flow, how is that going to impact TMDL limits? Need to know levels of something when you start.	Our SPARROW model assumes baseline conditions based on existing data. We knew it was a concern, and we are interested in relative change. How much difference do we see? Are we exceeding a threshold? I understand your concerns at the local level. Clusters can tip us off to areas in need of further analysis. We also need state agencies to get involved.
Greg Guthrie, GSA	That's a concern that falls under the realm of a variety of agencies (NRCS, ADEM). ADEM, as Marlon will talk about, have criteria for establishing source water protection for new wells, but when we talk about source water protection areas, are we talking about the same thing? For example, Fish and Wildlife Service may be different- we need to have consistent definitions.	Yes, we agree that the agencies present here today should get together and set those consistent definitions.
Greg Guthrie, GSA	We should follow up with these guys down the road and be able to say, "yes we are saving money and improving yields." This will help to demonstrate the success of the conservative practices.	A large part of the conservative practices' data will be collected through the Districts. Our idea is not to impose regulations that don't exist in the agricultural community; we can't regulate them. All we can do is create 'pluses' if farmers have demonstrated the past implementation of conservation practices.
Brian Atkins, OWR	When you're considering maximum available land for irrigation to create that 10 percent sustainable scenario, is that encompassing all agricultural land?	We include row crop agriculture, pastureland, and nurseries. We encompass anything that we think can be irrigated.

Table 3-3. Agency Scoping - Comments Received

Name and Affiliation	Comments	Responses
Brian Atkins, OWR	Alabama is different than Georgia and Mississippi; the land doesn't level itself in the same way. How do you deal with that?	We do not offer practices like land leveling, drainage, etc., that brings a different class of land into irrigation. We are not changing the landscape.
Jennifer Grunewald, USFWS	How are you using the T&E watershed maps?	Fish and Wildlife Service data that provides information on endangered species. Then we break it out by species.
Jennifer Grunewald, USFWS	There are certain species that have life history strategies that need access to certain places, headwaters, plains, etc. For example, the Slackwater darter is one of these species, and these should be incorporated.	The hot spot maps are more generalized at the HUC-8 level; however, we are concerned about the individual species, and we'd like to work with the US Fish and Wildlife Service to address any specific concerns to help identify potential project impacts and mitigation strategies. Shannon Weaver, with NRCS, has created charts about the potential effects each irrigation strategy/equipment could have, and we have included that into the EA. Also, NRCS-AL works with USFWS for conservation effects by practice and on-site consultation to make sure this is addressed. The tiered CPA-52 form addresses these concerns, as well.
Greg Guthrie, GSA	If you start using up the 'easy' applicants, then you'll have to deal with the difficult issues on a frequent basis. How willing are the farmers, who have applied, to use alternate methodologies to increase their ranking scores?	At this point, we don't show the points associated with each category. We don't want people jockeying with what they can do – when it comes to the stewardship points, we want to rank them according to what they've done in the past. We want to know if they've been a good conservationist.

Table 3-3. Agency Scoping - Comments Received

Name and Affiliation	Comments	Responses
Greg Guthrie, GSA	Was it originally agreed upon to use the original funding of $8 million to cover the nine watersheds identified in the SRA?	No. Even with additional funding of $10 million, we never said a specific number of watersheds would be covered by $8 million.
N/A	Where are we in the process of the Choc-Pea?	We are closing the scoping portion and entering the data-gathering stage.
Annie Blankenship, NRCS	One important note is to contact the recognized tribes that have connections to Alabama - there are 16 tribes that need to be contacted as sovereign governments.	Thank you for letting us know. We will be contacting you to help with cooperation and details regarding this very shortly.
Barbara Gibson, CPYRWMA	What do you realistically consider as your target farmer who can afford the cost-share?	We have two cost-share rates, 50 percent and 60 percent, which is not as high as Environmental Quality Incentives Program (EQIP), but this program is different than EQIP. So, it's what you said, it's whoever feels like they can afford the cost-share of irrigation. Irrigation is a risk-prevention tool overall. We had 122 people who showed interest in Choc-Pea, initially. We had 60 apply in Wheeler and put them through the ranking process and had a natural break at 33. So, the first 33 producers are the ones we are going to target right now. But we still have the environmental evaluations (EE) that must be done at each site. But out of the ~50 that applied, that's a high percentage of people/ projects that will be funded. *[Please note that the cost share rates have changed since this comment was made and are now 50% and 65%].*

Table 3-3. Agency Scoping - Comments Received

Name and Affiliation	Comments	Responses
Barbara Gibson, CPYRWMA	The need is there/present in the Wiregrass, but you won't meet that same percentage there because they can't afford it.	We must show that this program is successful with the limited money we've been able to get. If it is successful, hopefully the next phase will grant funding for higher cost-shares with those more financially unstable farmers. Also, these plans have a "lifespan" so that if we get more money in the future, NRCS-AL can go back into these basins we've previously worked in to fund more farmers that didn't get funded in the first round.
Barbara Gibson, CPYRWMA	What is the acreage max for an irrigation pond going to be?	It depends on what pond design you go with and it is also dependent at the site level. NRCS-AL is only able to do up to a certain amount, and then the Corps must come in to do the large ponds.
Barbara Gibson, CPYRWMA	What's the next thing you're going to do with this basin?	We will put together this draft plan and send it out for public and agency review. Then the ranking discussion meetings with SLO and farmers.
Barbara Gibson, CPYRWMA	So, the draft plan will be sent out in March, then when will the public and farmer meetings take place? And when the draft plan is approved and finalized, is that when the farmers can apply?	We did the public meeting in November in Ozark, and we haven't set up the other farmer meeting with SWCC yet; mainly waiting to finish up more of the Wheeler first. Hopefully, after the plan is done, we can have another official sign-up.

Table 3-4. Comments Received during the August 20, 2019 Farmer Scoping Meeting

Comments	Responses
The reason we need irrigation is simple. I was farming some corn yesterday and when I got to the end of the row where the disc had been raked. I couldn't turn around because there was no corn. Irrigation provides financial stability for the farmer. As far as our biggest concerns, our field sizes and water sources are the problem.	Thank you for your comment.
You can't grow anything without water. Whether it is pastureland, cows, row crop or truck crop, you must have some sort of water. We need dependable water.	Thank you for your comment.
In Alabama, farmers not having regular shaped fields is probably one of the biggest reasons we do not have as much irrigation as Georgia or our other neighboring states do. I think irrigation would be important for Alabama. It would be a key role in helping make us more sustainable to keep agriculture as a main stake.	Thank you for your comment.
One thing it says here: new irrigation. A lot of us, I would assume, have put in irrigation that is adequate to inadequate with our water sources. Are any of those going to account for the fact that it would take just a little more water to get where we can irrigate more?	The purpose of this project is to put new acres under irrigation. So, if you need more water to irrigate the field next to the one you are already irrigating, you're good. If you have a well that doesn't quite meet the needs of the field that you are already irrigating, we cannot help you with that because you are already irrigating that field. It must be on a field that is not currently being irrigated.
We have a great need for irrigation in this area. We also need drip irrigation. We have fields that you cannot just put a pivot on and leave the corners off. We need help with the ponds. We need help with the wells to feed the ponds to get three-phase power to it. We need everything because we are not set up for irrigation in this area.	Thank you for your comment.
So, are you saying if I am currently pumping out of a pond and I need a well for an existing system, am I qualified?	It is the purpose of this project and the purpose of this money to put new acres under irrigation.
What if you already have an irrigation system but you are going to put this $200,000 toward a bigger well for a pond, would that work?	If you are going to add acres under irrigation that is your top key. Adding acres for irrigation is the main purpose of this project. All the details after that, we can try and work with you on that.

Table 3-4. Comments Received during the August 20, 2019 Farmer Scoping Meeting

Comments	Responses
I would like to say that this year marks 20 years that we have been dealing with subsurface drip through Auburn University. We have been very successful with it. There have been some failures and there have been some things that we have learned over this 20-year period as far as what works and what doesn't work. However, we have figured out where subsurface drip is very successful, and it could work very well in those irregularly shaped fields.	Subsurface drip is a technology that is allowed in this project.
Based on my experience, every 10 years since the 1960s we have had a severe drought in Southeast Alabama. It has been a tremendous loss. Three to four years of that 10 years, it would not matter if we have irrigation or not. The other six years we could use irrigation to produce sustainable crops. We need irrigation because it strengthens the value of the property. If I was a banker, and I am not, I would loan for irrigation. I can't see farming peanuts and corn without irrigation in the Southeast. We have been doing it for years and years, but it doesn't make any economic sense to know the odds of one out of 10 crops are not going to make any profit. I think it is a must for farmers to irrigate if they can get it. We have some irrigation, but we need more.	We appreciate your comments. My colleagues at the Office of Water Resources can back up your claim of the frequency of drought. One of the goals of this project as we are looking at the environmental assessment is maximizing economic and community benefits. The other goals are our agricultural benefits, dependability, and then the opportunity to get credit knowing you have a cost-share on an irrigation system to help you move forward with expanded irrigation.
Irrigation helps us market our crops.	That is an excellent point. We appreciate your comments.
I have a question. Is this program going to be more merit-based? Are there certain practices or crops that are going to be looked at and said if you are raising this crop versus this one, you are more likely to be funded? Or is this going to be more like take what you got and divide it up between the acres that people want irrigated?	There will be ranking criteria for the project, but we are not going to tell you what crops you should farm. We will basically be looking at three things: (1), are you a good steward or conservationist? Are you putting in place practices to protect your land? (2), we will be looking at your water availability; (3), how much money are we going to have to spend to try and get power in? Those are the three big things we are going to be looking at.
I am fortunate enough to have a spring. It is groundwater but the water is coming to the surface for me. I use that to fill in a small pond. So, I am kind of all stages of the process. We have a lot of surface water, at times, in the South. If we could capture and distribute it this could be a good long-term solution.	Thank you for your comment. I hear that in the winter there is a lot of surface water in the Southeast, but during the growing season not so much.

Table 3-4. Comments Received during the August 20, 2019 Farmer Scoping Meeting

Comments	Responses
I have a question for you. Would we have to monitor the amount of water usage if we participate in this program? Is this a program where y'all say, "if you take this money, then you are going to have to report your water usage"?	To be involved in this program, you must get all the required certificates. One thing that you are required to have, if you have the capacity to pump over 100,000 gallons per day, this is not averaged throughout the year but on one day, then you must get a Certificate of Use from Water Resources. This is not a permit, but a certificate. Part of the certificate language is that you report your water usage to them, so they know how much water you are using.
I grew up in Geneva County. We have always used well water for everything we have done, but now I am working with The Nature Conservancy. I know one of the things we are concerned about throughout the Southeast is the competition for water. We are glad to hear Marlon Cook is on board and I know he has got a 3-D map of the basin showing where all the groundwater is. I would certainly love to see us tap into those groundwater reserves rather than ending up in a situation like Georgia and Florida where they are arguing over how they use surface water. Especially if we have as much groundwater as he says we do.	Thank you for your comment.
I'm not sure if this is the appropriate time, but I am beginning to think about exit strategies. I have been farming for 45 years and I am on the short end. How long of a requirement is this program? Do you have to commit to a certain number of years?	The requirement for O&M is that the practice must be maintained for 20 years. That NRCS can come out and inspect your farm for 20 years. That is the life of the pivot and that is why 20 years was chosen. However, that can transfer to someone else.
I would like to point out that when you say available at? Based on my experience, which is only in Henry and Houston County, to get this 700-800 gallons per minute you have to go 600-900 feet which is very expensive compared to across the river when they only have to 160-180 feet and pumping 2,000 gallons per minute out of a well that is 160 feet deep. I have never found that to be true in our area. We must go down deep which is very expensive. So, it is going to cost us more to irrigate 100 acres here than it does in Georgia or North Florida. To have an 8, 10, 12-inch well, you must go deep down to get close to 1,000 gallons per minute.	We appreciate that comment very much. That is something that we have heard from others as well and have been able to capture that and let it factor into the cost-share opportunities.
I agree with that and I am in the business of putting in wells. I really do think we need to monitor it. When you have these meetings 20 years down the road,	There is a drawdown during the growing season, but that area has a quick recharge. The fact that we can see that and document it is good.

Table 3-4. Comments Received during the August 20, 2019 Farmer Scoping Meeting

Comments	Responses
whoever is doing Marlon's job may not be giving us as good of information and that data we could have for the next 20 years could be critical for the future of your kids or grandkids that are taking over these farms. Sometimes, I feel like we get too worried about being monitored, but this is really about the future.	
For Geneva, we are triple pumping, or any way we can get it, into a reservoir, most of the time, and then pumping out of the reservoir to run the center pivot. I can't speak for Dale, Henry or Houston county, but that is how it is in Geneva. The wells we are using are around 300-400 ft and what we see on an 8-inch well is around 200-400 gallons per minute. Now in Geneva County, North of 52 is completely different than South of 52. If you can get into the Floridan Aquifer, then it is a completely different ball game than 50 miles north. I am not sure about the east side of Geneva County, but I am speaking more for central Geneva County.	At some point, you must look at the options with your well man to see what will be more cost-efficient for you. Either going deeper where you are going to have more pumping cost but not a reservoir, or a shallow well that is filling a reservoir and then running your pivot from the reservoir.
This is my concern. I do not know what a 1100-foot well is going to cost compared to something else. I just don't know the cost. I need someone to lay it out for me. Someone said it is going to cost this much to build a reservoir and the smaller pumps to fill the reservoir. That is what I need.	Having Marlon Cook on, as our hydrogeologist, is going to help with developing those strategies. He may not be able to give you a cost down to the dollar amount, but he will be able to tell you which strategies you need to look into then you can go talk to your well driller and he can give you an idea of prices. Go talk to NRCS about the cost of a reservoir and then put all these things together. Marlon should be able to develop strategies based on where you are located.
With the kind of year we have had this year mixed with the commodity prices this year, is there any scenario where you would give us, turn-key give us, this system where we are pumping with the staged turbine from the 800-foot level that we have to go through here in coffee county that you can draw crop and breakeven this year? I just don't think in the year given if you were to give us this system and had to pump groundwater from that depth and volume. I can tell you this year I have pumped every source of groundwater I had until I could no longer pump and I still lost crops. I don't see in a year like this, with the depth of our water, just the cost of electricity to bring water up from huge depths how we can breakeven. So, everyone's situation is a little different and this seems like it needs to be custom-tailored. The $200,000 plus someone else's $200,000,	Our suggestion on this what you see is what we scoped out in Middle Tennessee. If you have a current system that needs some retrofit, then there may be another program that can help you. I don't want you to get the feeling that it's this or that, that or this. When you come in and talk about what you need, we want to help you find something to help whether that is EQIP or this program. What we hear from you in this meeting is what you need. Each of you as an individual has unique water sources and a unique farm. So, if you need a reservoir, we want to work with you to try and help you get what you need.

Table 3-4. Comments Received during the August 20, 2019 Farmer Scoping Meeting

Comments	Responses
people are commenting on the price of the well, but there are places in Coffee County where you could spend that $400,000 and it still wouldn't provide enough water to operate an irrigation system and then the cost of operating and bringing the water up from that kind of depth is tremendous. Maybe this should be more flexible and more tailored. I hope every year is not like this year. In this area, what we need is more of a 911 water source to help get us through dry times... I think this money could be well spent helping people who already have a system and are trying to make it work so why shouldn't we bring them to the finish line? If someone puts up a new pivot and adds 5% of their lands, then can they qualify? What about adding another storage capacity? Or, another component to optimize what we are already doing? A lot of these people, who are cutting profits close every year, how are they going to be able to go to their banker and say, "Hey, this is a good program. It is 50% cost-share. I know I didn't pay you back last year or the year before that, but this is different."? When you come with this program and say, "we can only help you if you are adding new acres," why limit the program? Shouldn't the program be more flexible?	
The western edge of this basin area is the eastern boundary for my farm. If this US 84 is your eastern boundary then are you still able to apply for this money? Even if you touch this boundary?	If there are acres in your field that are in this basin, then the field is eligible. That may take someone going out with a GPS on the corner that you think is in the basin, coming back in and putting it in the computer to check.
There are a lot of new farmers here that would benefit a lot from irrigation. As an old farmer, I see irrigation as something that would help new farmers a lot. Instead of having these 50-50 grants and 60-40 grants, which will make you grow broke. Could you raise to 75-25 or 80-20, because it is tough when you get a $40,000 grant and you still owe $40,000? I think changing the cost-share amounts would help this program.	Thank you for your comments and we understand your concern.

Furthermore, a preliminary investigation (PI) and feasibility report (FR) were prepared to provide sponsors, local partners, agencies, and the public with information to evaluate the goals and

objectives of the project. During the development of the PI, project sponsors conducted initial consultation with natural resource agencies and stakeholders in the Choc-Pea Basin area.

3.5 Scoping Summary

Main resource concerns identified throughout the scoping process included aquatic resources, groundwater, soils, surface water, water quality and quantity, threatened and endangered (T&E) species, and cultural and historic resources. Table 3-5 provides a summary of resource concerns and their relevance to the proposed action. Resources determined to be non-relevant were eliminated from detailed study, and those resources determined to be relevant have been carried forward for analysis.

Table 3-5. Summary of Resource Concerns for the Choc-Pea Basin Area - Irrigation Expansion Project

ITEM/ CONCERN	Relevant to the Proposed Action?		RATIONALE
	YES	NO	
SOILS			
Upland Erosion	X		Potential for increased soil loss due to irrigation runoff.
Stream Bank Erosion	X		Potential for stream bank erosion during installation of surface water intake.
Sedimentation	X		Potential for additional runoff by increasing irrigation; might lead to more sediment transport.
Prime and Unique Farmland (Farmland Protection Policy Act)	X		Potential for protection and enhancement by increasing irrigation.
WATER			
Surface Water Quality	X		Potential for additional on-farm pollution runoff.
Surface Water Quantity	X		Potential for excess water withdrawal.
Ground Water Quality	X		Potential for groundwater leaching.
Ground Water Quantity	X		Potential for excess groundwater withdrawal.

Table 3-5. Summary of Resource Concerns for the Choc-Pea Basin Area - Irrigation Expansion Project

ITEM/ CONCERN	Relevant to the Proposed Action?		RATIONALE
Clean Water Act	X		Nationwide or individual permits may be required for projects if determined by NRCS consultation.
Regional Water Mgmt. Plans		X	This project will have a neutral effect on existing regional water management plans. This includes the Choctawhatchee, Pea, and Yellow Rivers Watershed Management Plan (2015), Hurricane Creek-Dowling Branch Water Management Plan (2008), Choctawhatchee River and Bay-Surface Water Improvement and Management Plan (2017), and Strategic Water Management Plan-Northwest Florida Water Management District (2018).
Coastal Zone Mgmt. Area		X	None in Project Area.
Floodplain Management		X	This project is not likely to increase risk of flood loss, or impact of floods on human safety, health, and welfare, as stated in Executive Order 11988. Also, it will not result in any changes to existing floodplain ordinances.
Forest Resources		X	Forest Resources will not be impacted by this project.
Wetlands	X		Potential for limited impact through additional runoff.
Flood Damages		X	Project is expected to have no impact on flooding. No multiple purpose dams that provides both flood and irrigation storage will be developed.
Ecological Critical Areas		X	Critical Areas will be avoided, minimizing potential impact.
Water Bodies (Including waters of the U.S.)	X		Potential withdrawals for irrigation could have an impact on both the quantity and quality of a water body.

Table 3-5. Summary of Resource Concerns for the Choc-Pea Basin Area - Irrigation Expansion Project

ITEM/ CONCERN	Relevant to the Proposed Action?		RATIONALE
Wild and Scenic Rivers		X	There are no Wild and Scenic Rivers in the Project Area.
AIR			
Air Quality	X		Potential for minimal impact due to machinery emissions and airborne dust would slightly degrade air quality during construction and maintenance. Increased irrigation is associated with increased fertilizer application which may impact air quality.
Clean Air Act		X	The Choc-Pea is not located in a nonattainment area. All project induced impacts to air quality would be minor and of short duration and will not breach limits set by the Clean Air Act. Increased fertilizer application would be minimal and not breach limits set by the Clean Air Act.
PLANTS			
Endangered and Threatened Species	X		Potential to "may affect." Impacts to both water quality and quantity may impact threatened & endangered aquatic species.
Essential Fish Habitat		X	None present in the project area.
Invasive Species		X	Project will not affect populations or re-location of invasive species. Crop management techniques are expected to remove invasive species that would be of concern.
Natural Areas		X	Project will have no effect on natural areas in the basin area.
Riparian Areas	X		Riparian areas may be affected by surface water intakes. Potential for stream bank erosion during installation of surface water intake.

Table 3-5. Summary of Resource Concerns for the Choc-Pea Basin Area - Irrigation Expansion Project

ITEM/ CONCERN	Relevant to the Proposed Action?		RATIONALE
ANIMALS			
Fish and Wildlife Habitat	X		Potential for affecting fish and wildlife habitat through irrigation runoff that may cause erosion and sediment/nutrient transport.
Coral Reefs		X	None in Project Area.
Endangered and Threatened Species	X		Potential to "may affect." Impacts to both water quality and quantity may impact threatened & endangered aquatic species.
Invasive Species		X	Project will not affect populations or re-location of invasive species.
Migratory Birds/Bald and golden Eagles		X	Purpose of action is not to take migratory birds or Eagles and will not have an impact on these populations.
HUMANS			
Cost, NED	X		Federally assisted plan will maximize net economic benefits and meet the required criteria by Economic & Environmental Principles and Guidelines (P&G).
Historic and Cultural Resources	X		Historic properties are in the project area. There is potential to affect cultural resources eligible or potentially eligible for the National Register of Historic Places, which will depend upon the specific areas of ground disturbance.
Environmental Justice		X	Project intended to benefit subject populations. No environmental justice groups adversely impacted by the project. Compliance with E.O. 12898.
Local and Regional Economy	X		The Local and Regional Economy is expected to benefit from this project. Actions proposed by this Plan recommends sustainable groundwater and surface water withdrawals that will cause minimal to no effect on competing interests.

Table 3-5. Summary of Resource Concerns for the Choc-Pea Basin Area - Irrigation Expansion Project

ITEM/ CONCERN	Relevant to the Proposed Action?		RATIONALE
Potable Water Supply	X		There is potential for localized excess groundwater withdrawal where karst geology limits groundwater production. Sites identified for implementation will also undergo onsite evaluations as outlined in the Environmental Evaluation Worksheet (NRCS-CPA-52) to identify any potential localized risk to water supply.
Recreation		X	The project is anticipated to have no effect/neutral effect on recreation. Considering the potential project areas are already designated and being used for agricultural production currently, there are no recreational opportunities present in the proposed project area.
Scenic Beauty and Parklands		X	None impacted by the project.
Public Health and Safety		X	Minimal potential for injuries during temporary project construction and maintenance.
Land Use		X	No impact. The land use in the project area is not expected to change due to project.
Significant Scientific features		X	No significant scientific features will be affected by this project.

4. Affected Environment

4.1 Location

The Choc-Pea Basin Area encompasses 1,988,597 acres spanning the Upper and Lower Choctawhatchee River and the Pea River HUC-8 watersheds. The potential area for project implementation will occur on existing agricultural land with no current irrigation present. This simplifies the potential project acreage to 439,666 acres, approximately 22 percent of the entire area of the basin. The Choc-Pea Basin also encompasses all or portions of 111 Hydrologic Unit Code-12 (HUC-12) sub-watersheds in Alabama. The basin reaches through the following Alabama counties:

Barbour, Bullock, Coffee, Covington, Dale, Geneva, Henry, Houston, and Pike. A map of the Choc-Pea Basin is shown below in Figure 4-1. The Choc-Pea encompasses one of the largest agricultural producing regions in the state and lies within the 2nd Congressional District (see Figure 4-2).

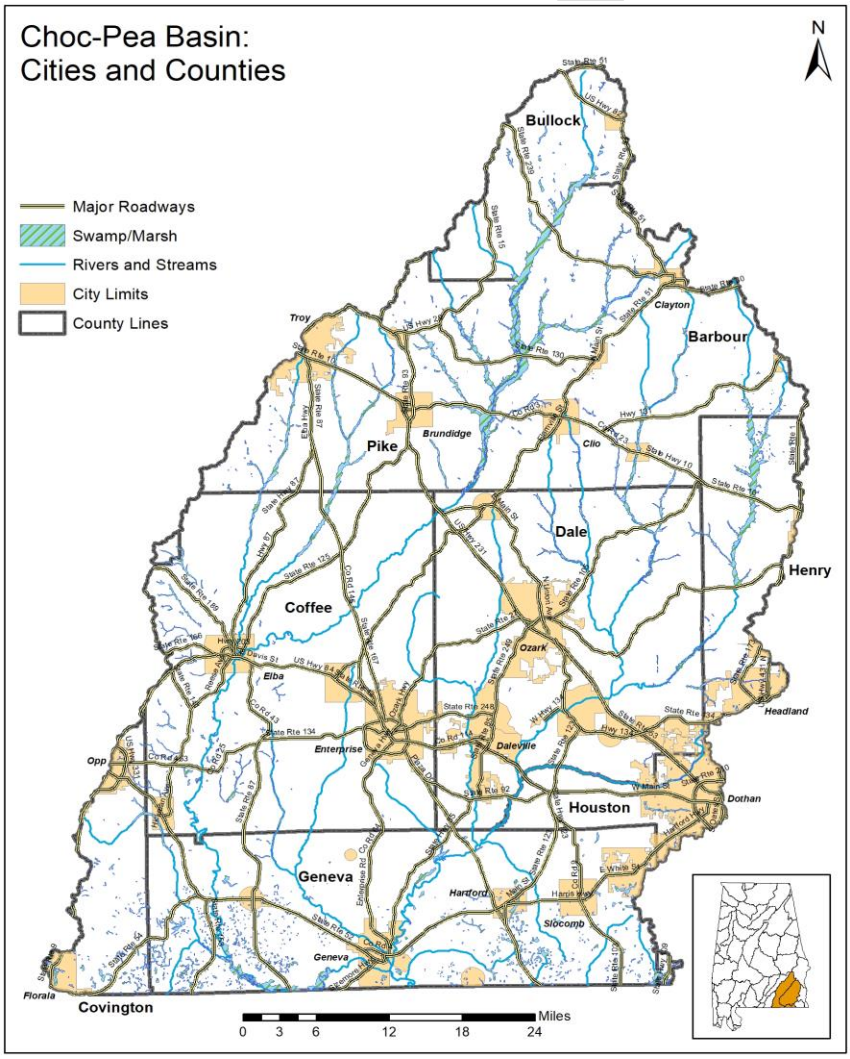

Figure 4-1: Map of the Project Basin

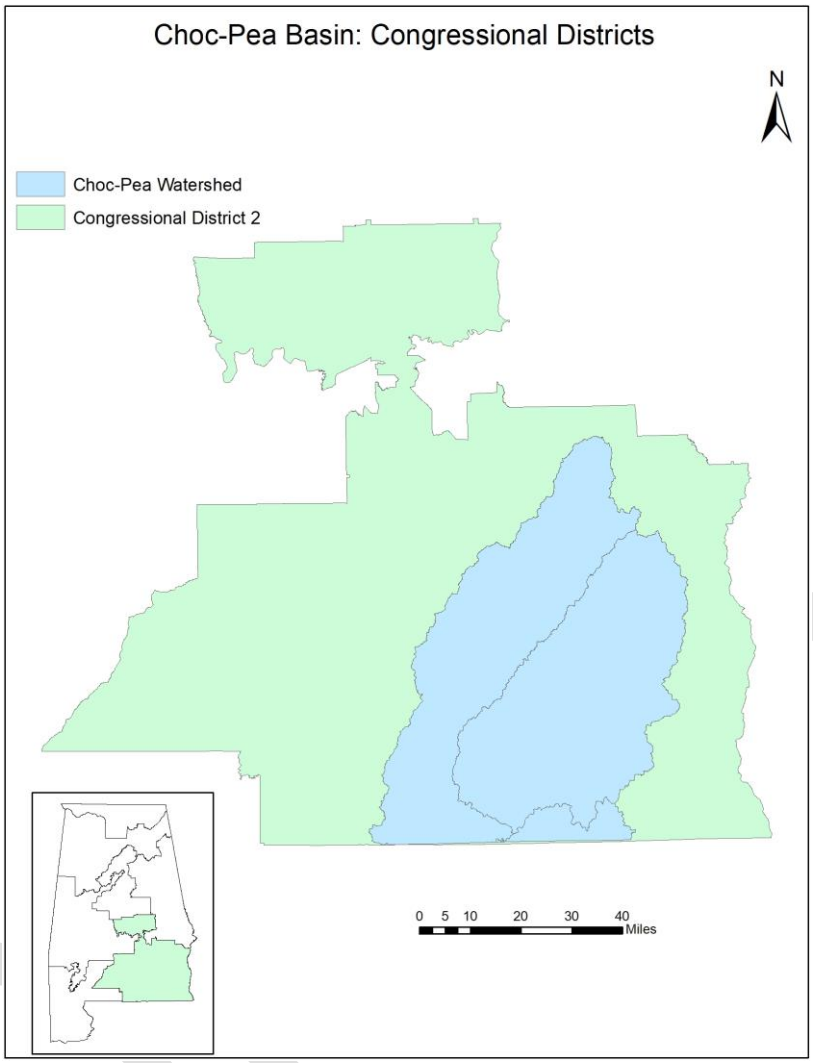

Figure 4-2: Map of Congressional District Overlapping the Choc-Pea Basin

The GSA reports that the Choctawhatchee River is the longest unregulated river in Alabama with a total length of approximately 170 miles (Cook & Murgulet, 2010). The Pea River originates from beaver swamps in Bullock County and serves as the major western tributary of the Choctawhatchee River watershed. The Pea River flows southwestward for approximately 68 miles to Elba (northwest Coffee County) southward for 30 miles into Geneva County, and then gradually eastward briefly flowing into Florida before joining the Choctawhatchee River south of Geneva. The total length of the Pea river is 128 miles and it drains an area of 1,452 square miles. The Choctawhatchee and Pea Rivers flow southward across southeastern Alabama and join at the city of Geneva, near the Florida state line (Cook & Murgulet, 2010).

4.2 Cultural and Historic Resources

NRCS recognizes that cultural and historic resources are an integral part of our national heritage and recognizes its responsibilities for historic preservation, particularly for properties listed on, or eligible for listing on, the National Register of Historic Places (NRHP). Under NEPA regulations (40 CFR Part 1508.8) and in compliance with "Section 106" of the NHPA and its implementing regulations at 36 CFR Part 800, every Federal agency, including NRCS, is expected to consider the impacts of their actions on historic and cultural resources—including actions they may assist, fund, license, or permit—and take steps to avoid or minimize the potential for adverse effects. NRCS-AL ensures compliance with the NHPA by using alternate procedures stipulated under a State-based Prototype Programmatic Agreement (SPPA) between the NRCS-AL state office and the Alabama Historical Commission (AHC; NRCS-AL, 2017), as authorized by the Advisory Council on Historic Preservation (ACHP) under 36 CFR Part 800.14(b)(4) of the regulations implementing "Section 106" of the NHPA (see Donaldson, 2014).

Under a SPPA, NRCS practices and activities that have no potential to affect cultural resources have been identified through consultation with the AHC. The SPPA and classifications of effects to cultural resources can be found in Appendix E, Figure E-33. The extent of potential impacts on historic and cultural resources will be evaluated when the Area of Potential Effects (APE) for specific project sites have been identified by the NRCS and the SLO and in accordance with NRCS policies and procedures for identifying, evaluating, and protecting cultural resources, including historic properties, and in compliance with the National Historic Preservation Act

As defined in 36 CFR Part 800.16(l)(1),"historic properties" means any prehistoric or historic district, site (including archaeological), building, structure, earthwork, or object listed in, or eligible for listing in, the NRHP maintained by the National Park Service (and codified at PL 113-287, 54 U.S.C. 302101-302108) and properties of traditional religious and cultural importance to an American Indian Tribe, Alaska Native, or Native Hawaiian Organization, and includes artifacts, records, and material remains that are related to and located within such properties. The term "cultural resources" encompasses all the tangible remains of past activities and accomplishments of people. These include historic properties and unevaluated resources that may be eligible for inclusion in the NRHP or a State or local equivalent, and may also include cemeteries and less tangible resources such as karst features (e.g., caves, rock shelters, or sinks), landscapes (i.e., geographic areas that include both cultural and natural resources that exhibit cultural or aesthetic value), vistas, sacred sites, and cultural or religious practices.

The NRHP, the Alabama Register of Landmarks and Heritage (ARLH) and the Alabama Historic Cemetery Register (AHCR) maintained by the AHC and the Alabama Cultural Resources Online Database (ACROD) maintained by the University of Alabama Office of Archaeological Research (OAR), were used in conjunction with ArcGIS to assess any known historic properties and cultural resources located within the basin area. Sixteen non-archaeological historic properties listed in the NRHP were identified within the basin and include one historic object (a monument), one historic district, and fourteen historic buildings, one of which is also designated a National Historic

Landmark (NHL; NPS, 2019; see Table 4-1, below). Thirty-seven non-archaeological resources listed in the ARLH were identified and include homes, schools, churches and associated cemeteries, mills, and districts, among others (AHC, 2019a; see Table 4-2, below). Additionally, approximately thousands of previously identified archaeological sites are located within the basin area (ACROD, 2019).

Table 4-1. NRHP and NHL properties identified within the Choc-Pea Basin

County	Property Name	NRHP Listed Date	NHL Designated Date	Level of Significance - State
Barbour	Miller-Martin Town House	12/16/74		
Barbour	Petty - Roberts - Beatty House	1/21/1974		
Barbour	Grace Episcopal Church	9/22/1995		
Barbour	Henry D. Clayton House	12/8/1976	12/8/76	
Bullock	Merritt School	2/20/1998		ARLH
Coffee	Rawls Hotel	9/17/1980		
Coffee	Seaboard Coastline Depot	8/7/1974		
Coffee	Coffee County Courthouse	5/8/1973		
Coffee	Pea River Power Company Hydroelectric Facility	8/1/1984		
Coffee	Boll Weevil Monument	4/26/1973		
Dale	Oates-Reynolds Memorial Building	6/13/1974		
Dale	Claybank Log Church	11/7/1976		

Dale	J.D. Holman House	2/19/1982		
Dale	Samuel Lawson Dowling House	5/30/1996		
Henry	Seaboard Coast Line Railroad Depot	9/4/1980		
Pike	Troy High School (Demolished in 2010)	8/30/1984		ARLH

Table 4-2, below, lists the ARLH resources identified within the Choc-Pea Basin.

Table 4-2. ARLH Resources within the Choc-Pea Basin

County	Property Name	ARLH Listed Date	Level of Significance - National
Barbour	Clayton Presbyterian Church	3/20/1981	
Barbour	Fenn-Boyd House	4/11/1984	
Barbour	Wallace Home (Destroyed by fire ca. 1980s)	8/14/1975	
Bullock	First Baptist Church	12/4/1992	
Bullock	Old Merritt School	11/2/1990	NRHP
Bullock	Old Parsonage for United Methodist Church	12/19/1991	
Bullock	St. James C.M.E. Church	12/19/1991	
Coffee	Folsom House (Moved from original location in 2003)	9/17/1976	
Coffee	Enterprise City School	6/18/2015	
Coffee	Enterprise Methodist Church, ca. 1903-04	9/6/1984	
Coffee	Rawls House	3/30/1989	

Table 4-2. ARLH Resources within the Choc-Pea Basin

County	Property Name	ARLH Listed Date	Level of Significance - National
Coffee	Rawls Warehouse and Cotton Gin, ca. 1908-1959	6/12/2014	
Coffee	Prestwood Grist Mill, ca. 1848	10/11/1978	
Dale	Ariton Universalist Church, ca. 1913	3/23/1990	
Dale	Veteran's Memorial Bridge	5/17/1977	
Dale	Clopton Methodist Episcopal Church, ca. 1924	9/28/2000	
Dale	Eagle Stadium, ca. 1946	3/29/2012	
Dale	Ike Riley Estate, ca. 1925	9/29/2005	
Dale	Kolb-Chesser House	4/14/1978	
Dale	Pleasant Grove Primitive Baptist Church, ca. 1841	6/19/1997	
Dale	Mack M. Matthews School	8/25/2011	
Dale	Spring Hill Methodist Church, ca. 1876	8/13/1987	
Geneva	Finks Mill	11/26/1975	
Geneva	The Black House (Demolished)	6/27/2007	
Geneva	Emma Knox Kenan Library	2/25/1985	
Geneva	Geneva Railroad Depot (Demolished)	4/29/1977	
Henry	Edwin Community Clubhouse, ca. 1930s	9/28/2000	

Table 4-2. ARLH Resources within the Choc-Pea Basin

County	Property Name	ARLH Listed Date	Level of Significance - National
Henry	Wright's Chapel Cemetery and Church Site	12/19/1991	
Houston	First Missionary Baptist Church	5/3/2001	
Houston	Murphy's Grist Mill (Demolished)	6/16/1976	
Pike	Brundidge City Hall (Determined Eligible in 2006 but never listed)		
Pike	Johnston Mill	8/25/2011	
Pike	Lightfoot House, ca. 1897	8/6/1993	
Pike	Union Springs Primitive Baptist Church	10/1/1997	
Pike	Troy Downtown Commercial Historic District	2/21/2013	
Pike	Academy Street High School, ca. 1948	3/29/2012	
Pike	Troy High School (demolished in 2010)	11/30/1977	NRHP

A total of 319 named cemeteries have been identified thus far within the project area, and thirty-six cemeteries are listed on the AHCR (AHC, 2019b). These NRHP, ARLH, and AHCR resources were mapped to the basin boundary. See Figures 4-3 and 4-4 for maps regarding NRHP, ARLH, and AHCR resources identified within the basin.

The extent of potential impacts on historic and cultural resources will be evaluated when specific project sites have been identified by NRCS-AL and the SLO and the Area of Potential Effects (APE) for each project site is defined by NRCS-AL in accordance with NRCS policies and procedures for identifying, evaluating, and protecting cultural resources and historic properties (see GM [Part 401 Subpart C], NCRPH, and NI [Part 315]), and in compliance with the State-based Prototype Programmatic Agreement (SPPA) and the NHPA. As defined at 36 CFR 800.16(d), the APE *is the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if such properties exist. The area of potential effects is influenced by the scale and nature of the undertaking and may be different for different kinds of*

effects cause by the undertaking. In defining the APE for specific project sites, NRCS-AL will consider varying combinations of geographical location, topography, soils, vegetation, and other environmental factors in addition to the scale and nature of proposed new construction, including modification or demolition of structures and the built environment, and the extent of ground disturbance, as applicable.

Under the SPPA, NRCS-AL conservation activities, enhancements, or practices ("undertakings") that have little to no potential to effect historic properties have been identified through consultation with the AHC. Per the SPPA, a NRCS-AL undertaking has little to no potential to affect historic properties when the following exceptions apply:

a. Conservation activities, enhancements, or practices are limited to management.
b. Conservation activities, enhancements, and practices are applied through aerial, chemical, or biological means.
c. Conservation activities, enhancements, and practices are applied manually or with hand-tools.
d. Conservation activities, enhancements, and practices are applied to the modern ground surface and involve no subsurface disturbance.
e. Conservation activities, enhancements, and practices occur within existing tilled soils, croplands, or areas of surface disturbance, and will not exceed the existing depth of tillage or previous disturbance.

If, as specific project sites are identified through the planning process (beginning with the Environmental Evaluation Worksheet [NRCS-CPA-52]), NRCS-AL determines that a proposed undertaking meets the criteria for one of the five exceptions listed above, NRCS-AL is not required under the SPPA to consult further with the AHC under "Section 106" unless a cultural resource or historic property is immediately adjacent to (within 300 feet) or in the APE. If, as specific project sites are identified during the planning process, NRCS-AL determines that a proposed undertaking does not meet one of the five exceptions listed above or a cultural resource or historic property exists in or immediately adjacent to the APE (within 300 feet), a Cultural Resources Review Form (Appendix E – Figure E 34) will be completed for the project site and submitted to the NRCS-AL CRS for further review. Per the SPPA, the CRS will then assist the STC in determining whether a proposed undertaking for a specific project site has the potential to affect historic properties, triggering "Section 106" review, pursuant to 36 CFR Part 800.3(a). NRCS-AL will provide its proposed APE, identification of historic properties and/or scope of identification efforts, and assessment of effects to the AHC, Tribal Governments and/or THPOs, and other consulting parties, as appropriate, in a format that meets the standards outlined in 36 CFR Part 800.4-5 and 800.11. In accordance with the SPPA, NRCS-AL will avoid adverse effects to historic properties whenever possible. Such avoidance efforts may include modifying or moving the undertaking to avoid adverse effects.

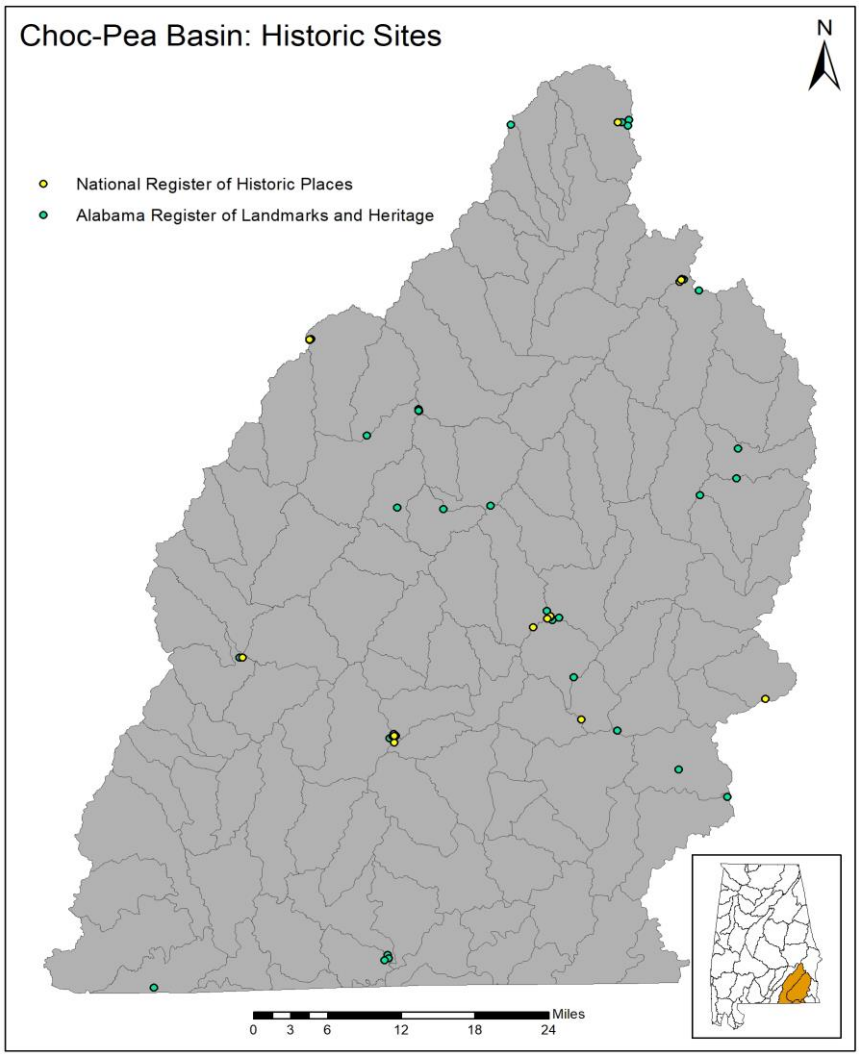

Figure 4-3: Identified National Register of Historic Places and Alabama Register of Landmarks and Heritage Sites

Maps of the AHCR-listed sites and named cemeteries in the Choc-Pea are depicted in Figure 4-4.

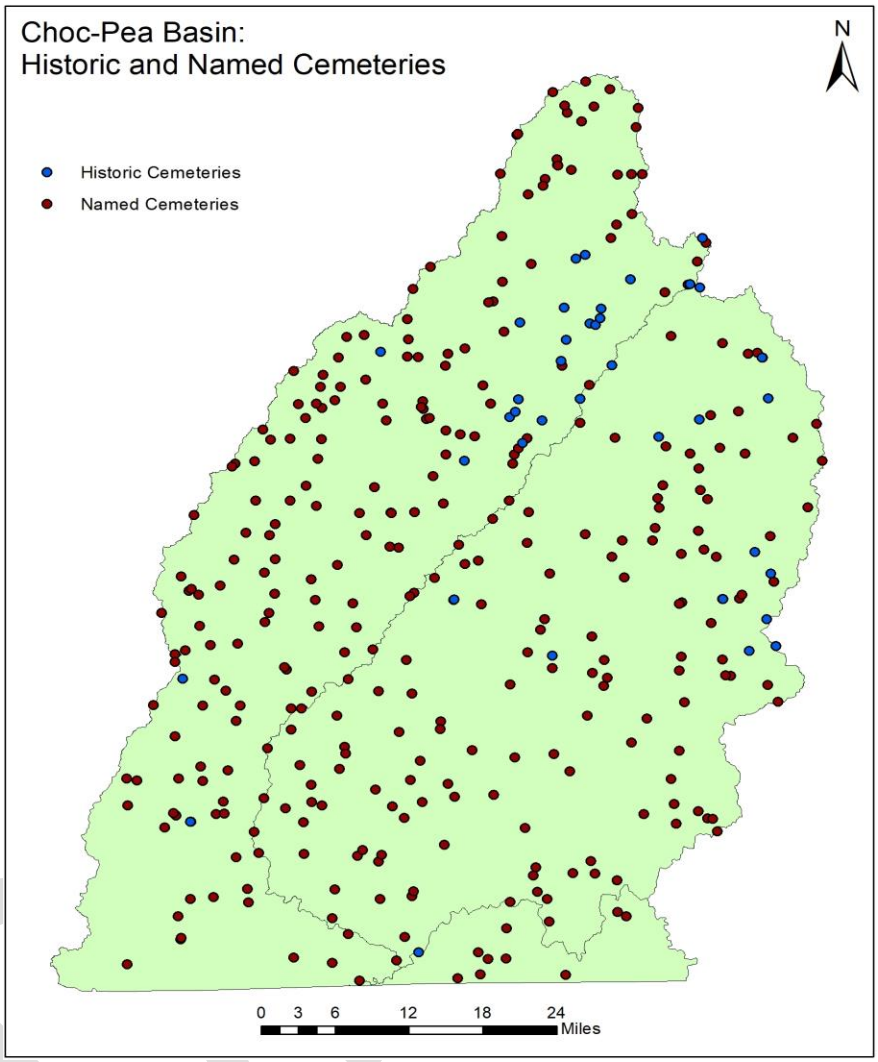

Figure 4-4: Identified Historic and Named Cemeteries

4.3 Geology and Soils

4.3.1 Geology

The Choc-Pea Basin lies within the East Gulf Coastal Plain physiographic section of Alabama. Geologic units underlying the Coastal Plain are of sedimentary origin and consist of sand, gravel, porous limestone, chalk, marl, and clay. The Choc-Pea Basin lies primarily on the Dougherty Plain and Southern Red Hills physiographic regions and partially within the Chunnenuggee Hills physiographic region (Sapp and Emplaincourt, 1975). Four of these districts including Chunnenuggee Hills, Southern Red Hills, Dougherty Plain, and Southern Pine Hills are present in the Choc-Pea area. See Figure 4-5 for a generalized map of the geology of southeastern Alabama.

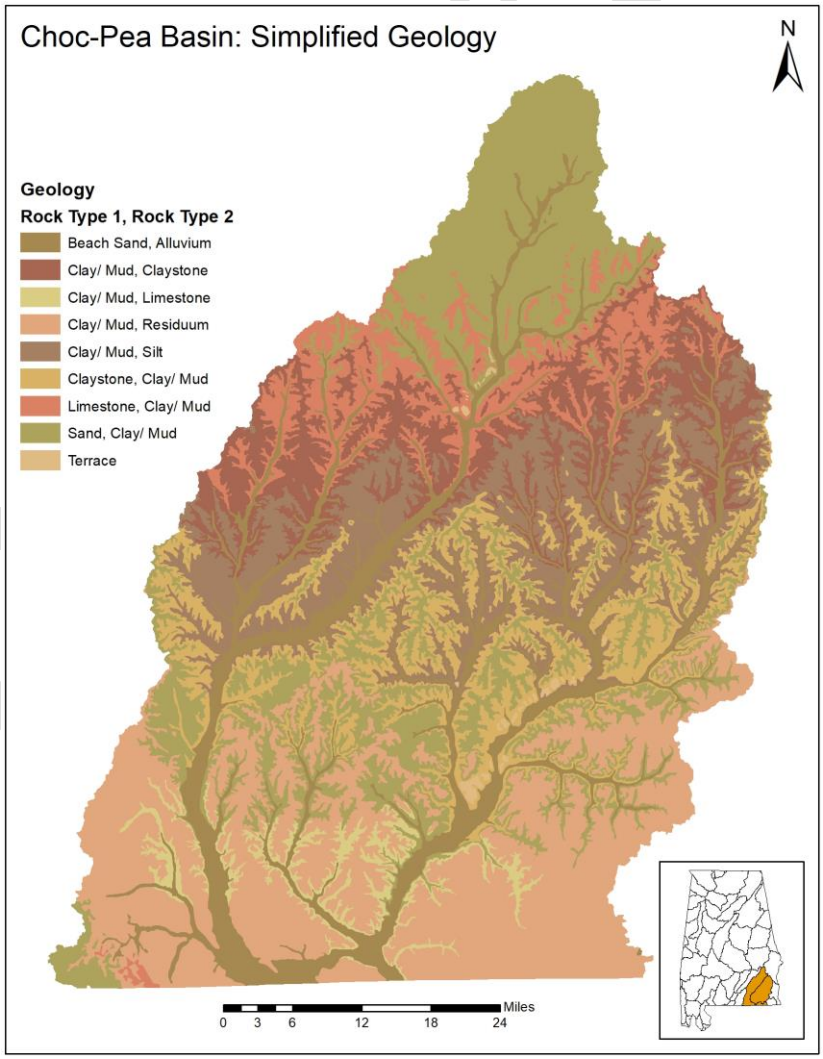

Figure 4-5: Map of Simplified Geology Within Choc-Pea Basin

The Dougherty Plain, located in the southern part of the study area, consists of undifferentiated limestone residuum, bedded sand and clay, and surficial terrace material with a low cuesta-like topography (Sapp and Emplaincourt, 1975). The confluence of the Choctawhatchee and Pea Rivers occurs in the Dougherty Plain in southern Geneva County.

North of this physiographic region is the Southern Red Hills district with southward-sloping upland and moderate relief. Topographic relief in the Southern Red Hills is some of the greatest in the Coastal Plain of Alabama where streams are characterized by high gradient, hard-rock bottoms, and swifter flows. The headwaters of the Choctawhatchee River originate in this physiographic region.

The Chunnenuggee Hills district consists of a series of pine-forested sand hills and cuestas developed on chalk (west Alabama) and more resistant beds of clay, siltstone, and sandstone. The Pea River headwaters originate in this district (Sapp and Emplaincourt, 1975).

A small area of the Choc-Pea Basin is composed of the Southern Pine Hills district and is found within extreme southern Covington County. Topography in this area is low-relief and has V-shaped valleys with sand and clay sediments. This portion of the region has thin sand and clay sediments overlying limestone. Flat uplands with shallow ponds, bogs, and marshes occur throughout the district, and many of the valleys are saucer-like, perpetually wetted by seepage from nearby hills (Gibson et. al, 2015).

4.3.2 Soils

Soil types vary within the Choc-Pea Basin area. As depicted in the most recent USDA-NRCS map of the soil areas in Alabama (Figure 4-6), the Choc-Pea area consists primarily of Coastal Plain soils. However, a small area of Major Flood Plains and Terraces soils are also captured within the basin.

According to the USDA-NRCS Soil Survey, most of the soils within the Coastal Plain areas are derived from marine and fluvial sediments eroded from the Appalachian and Piedmont plateaus (NRCS, n.d.). The area consists of Upper and Lower Coastal Plains. Dothan and Orangeburg soils are very extensive in the eastern region of the Lower Coastal Plain. They have a loamy subsoil and a sandy loam or loamy surface layer. Smithdale and Bama soils are very extensive in the western part of the Coastal Plain. These soils have a loamy subsoil and a sandy loam surface layer. Most slopes are less than 15 percent (NRCS, n.d.). Major crops grown in this region are corn, peanuts, soybeans, and horticultural crops.

The Major Flood Plains and Terraces soils are not extensive but important when they are found along streams and rivers (NRCS, n.d.). They are derived from alluvium deposited by the streams. The Cahaba, Annemaine, and Urbo series represent major soils of this area. Production within the typical area consisting of these soils include cultivated crops on the nearly level terraces and bottomland hardwood forest on the flood plain of streams (NRCS, n.d.).

Soil type data specific to the Choc-Pea Basin was mapped using the State Soil Geographic Dataset (STATSGO) and the NRCS Soil Survey Geographic Database (SSURGO), as shown in Figures 4-7 and 4-8, respectively.

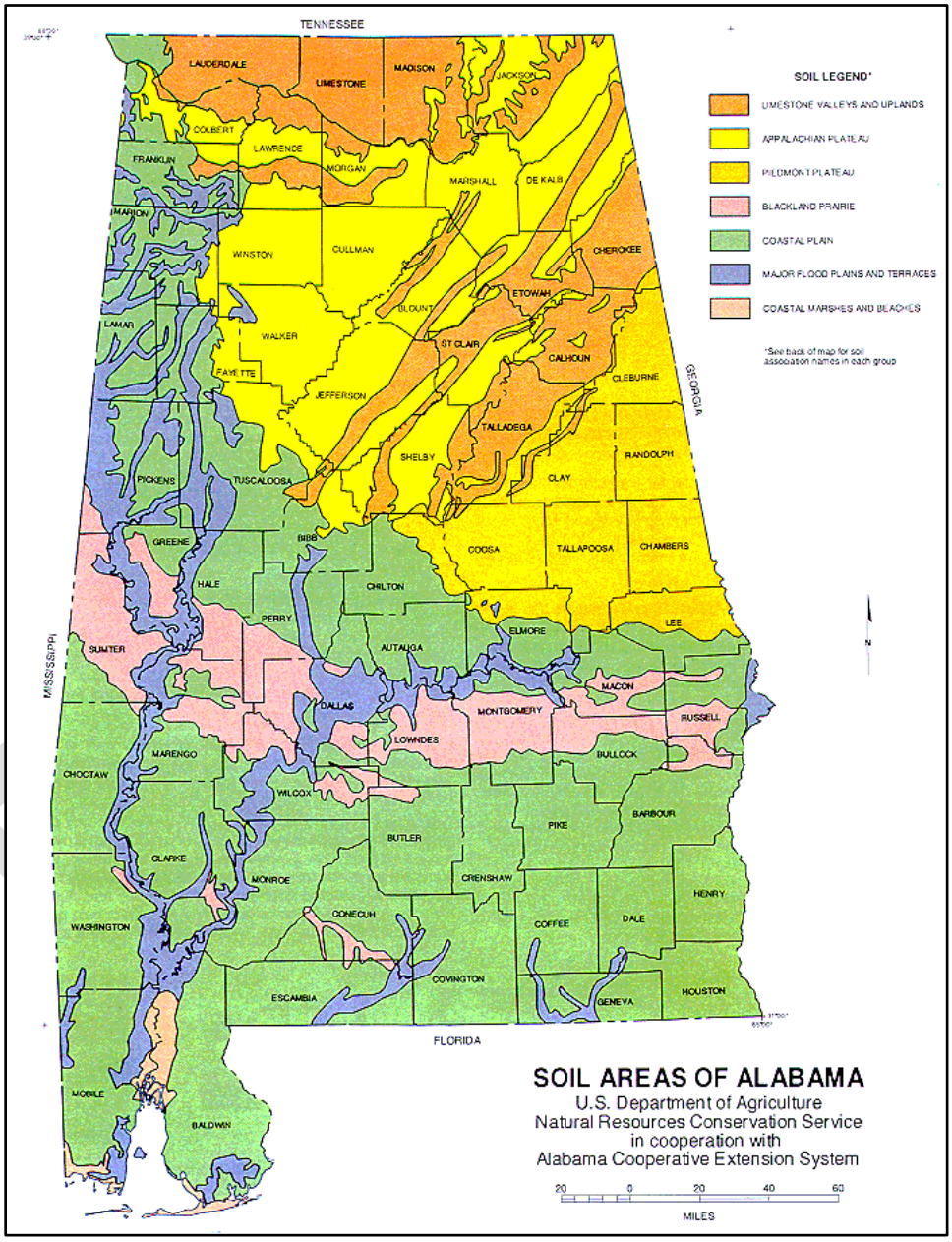

Figure 4-6: Soil Areas of Alabama

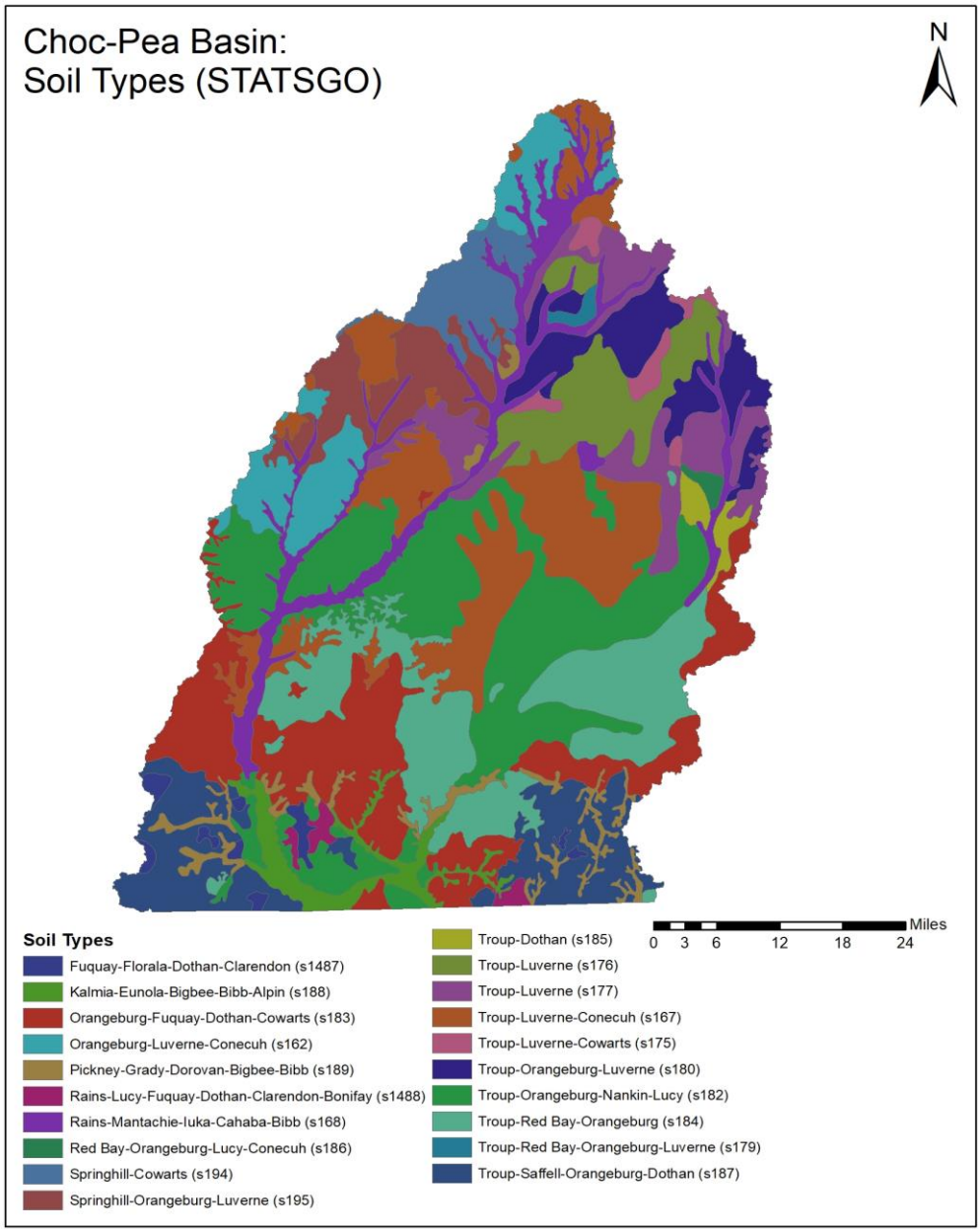

Figure 4-7: STATSGO Map of Soil Types

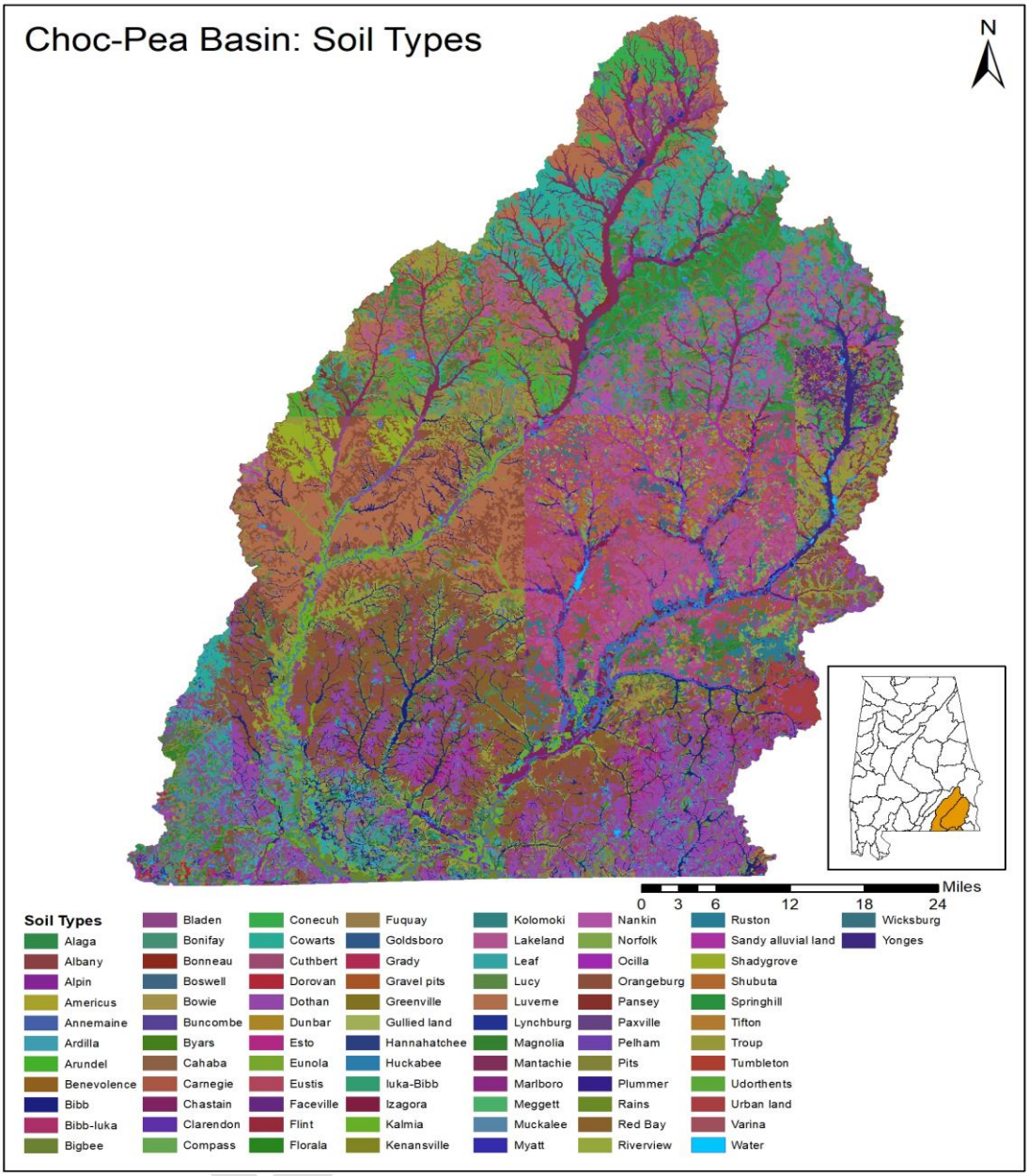

Figure 4-8: SSURGO Map of Soil Types

4.3.2.1 Farmland Classification

Using the Soil Classification Capability Class demarcations, the majority of the Choc-Pea Basin is split between grades one through three and six through seven, as shown in Figure 4-9. Soils classified between one and four are generally considered "good" for both rainfed and irrigated crop production.

While soil class one is preferred with “few limitations that restrict their use” (SSURGO, 2018), class four is described as “severe limitations that reduce the choice of plants or that require very careful management or both” (SSURGO, 2018). Any soils classified as five or greater are not considered suitable for crop production, but rather for pasture, rangeland, forestland, or wildlife habitat (SSURGO, 2018). Soils from capability classes one through four make up much of the southern portion of the basin. The areas where the capability classes are higher than four are largely situated in the Northern section of the basin. This generally correlates with the type of agriculture that currently exists within these regions of the basin.

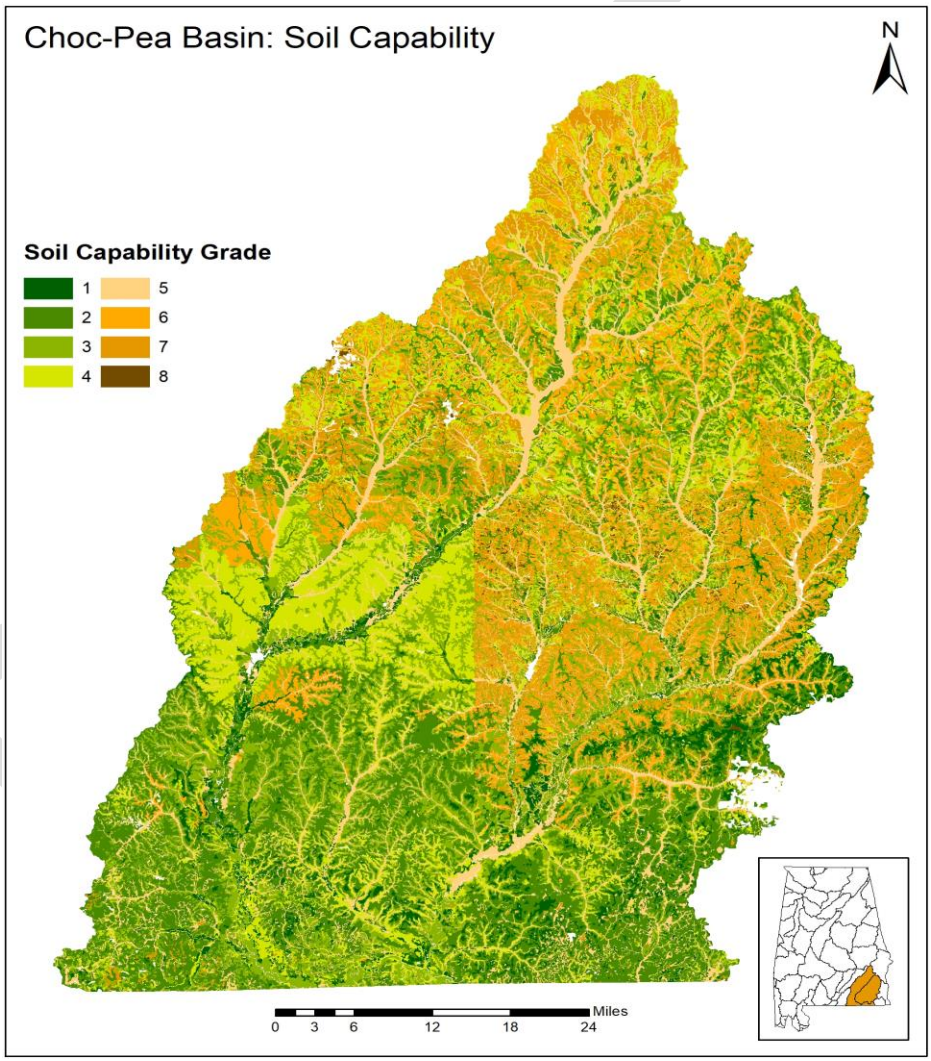

Figure 4-9: Soil Capability Classes in the Choc-Pea Basin

4.4 Land Use

Current land use in the Choc-Pea comprises these main categories: forest (49 percent), agriculture (23.2 percent), urban (6.5 percent), shrubland (15.9 percent), wetlands (4.7 percent), open water (0.8 percent), and Barren land (0 percent). The breakdown of the basin land use is depicted in Table 4-3. Furthermore, the areas of the varying land usages are illustrated in Figure 4-10.

Table 4-3. Land Use and Acreage

		Acres	Percentage of Watershed[1]
Total Acreage		1,988,597	100%
Agricultural Production	Total	461,837	23.2%
	Irrigated	22,171	1.1%
	Rainfed	439,666	22.1%
Forested Land		973,840	49.0%
Developed Land		128,694	6.5%
Open Water		16,154	0.8%
Wetlands		92,523	4.7%
Shrubland[1]		315,436	15.9%
Barren[2]		114	0.0%

[1]The percentages of each land use category was rounded to the nearest tenth, thus, the sum of all the parts may differ from 100% by $\leq$0.2.
[2]Shrubland is a region dominated by bushes or small trees.
[3]Barren land is land where plant growth may be sparse, stunted, and/or contain limited biodiversity.

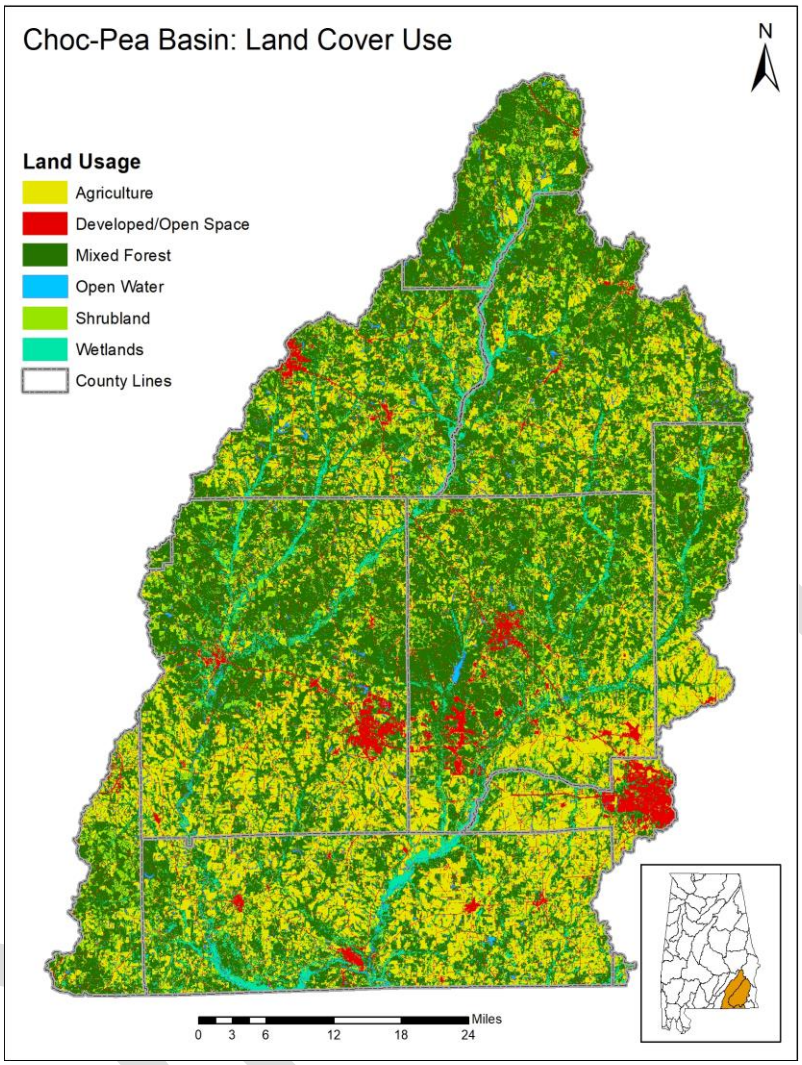

Figure 4-10: Map of Land Use Within the Choc-Pea Basin

The region is heavily forested with the prominent forest type being evergreen. Other common vegetation classes are deciduous, shrubland, mixed forest, and grassland herbaceous.

As noted by the CPYRWMA, there are two distinct areas of intense agriculture observed within the basin. “The boundaries of these areas were derived by assessing the geology, soils, physiography, topography, and land-use patterns. Area A extends from the Pea River in Pike County and eastward to central Barbour County, and area B extends from Andalusia in Covington County to Dothan in Houston County. Clayton, Porters Creek, and Nanafalia Formations, all of which are composed of sand, clay, and limestone, dominate the geology of area A. Area B is underlain primarily by the Gosport Sand, Lisbon Formation, Tallahatta Formation, Jackson Group undifferentiated, and residuum that contains sand, clay, claystone, chert, and limestone. Boundaries of intensive

agricultural land use conform closely to geologic contacts. The geology of these regions is the basis for soils, which are conducive to row crop agriculture" (CPYRWMA, n.d.).

Urban areas are defined by developed land with low, medium, or high intensity. Wetland classes include woody wetlands and herbaceous wetlands. General land use classifications were derived from the USDA Crop Data Layer (2019).

4.4.1 Land Ownership

According to the U.S. Census Bureau Statistical Abstract of the United States from 2000, 7.1 percent of Alabama's land ownership was State/Federally owned, and 92.9 percent were privately owned (U.S. Census Bureau, 2015).

4.5 Agriculture

4.5.1 Recent Change in Agricultural Production

Agricultural production data, such as farm size and number of farms, were assessed by county using information from the United States Department of Agriculture National Agricultural Statistics Service (USDA NASS) and county agricultural economic reports from AU (Table 4-4).

The Census of Agriculture showed the study area averaged 609 farms per county in 2017 (USDA, 2019). Covington County had the most with 907 farms, and Bullock County had the least with 255 farms. The average acreage for farmland was 157,249 acres among the nine counties. The percent rate of change in number of farms across Alabama from 2012 to 2017 decreased by more than six percent. Of the counties within the project basin, the percent change in number of farms was highest in Geneva County with decrease of over 19 percent and lowest in Pike County with decrease of one percent. In total, the counties within the basin experienced a decrease of 728 farms between 2012 and 2017.

Geneva County had the most farmland acreage with 183,356 acres and Bullock County had the least with 115,302 acres. The total acreage for farmland in Alabama is 8,580,940 acres. The percent change in farmland acreage from 2012 to 2017 in Alabama decreased by almost four percent. Within the counties making up the Choc-Pea Basin, change in farmland acreage ranged from a high in Bullock County with a decrease of 30 percent, to a low change in Pike County with a decrease of less than one percent (USDA, 2019). Nonetheless, there was a slight increase in the change of farm acreage within Dale County and Henry County. Overall, the counties within the basin experienced a decrease of 248,074 acres between 2012 and 2017. See Table 4-4 for a more illustrious depiction of the percent changes within the Choc-Pea counties.

Table 4-4. Change in Agricultural Land and Farms from 2012-2017

	2012	2017	Percent Change	2012	2017	Percent Change
County	**Number of Farms**			**Land in Farms (Acres)**		
Barbour	571	498	-12.78%	204,258	152,748	-25.22%
Bullock	273	255	-6.59%	164,600	115,302	-29.95%
Coffee	899	788	-12.35%	202,255	177,221	-12.38%
Covington	1,051	907	-13.70%	208,556	161,414	-22.60%
Dale	487	469	-3.70%	129,788	137,007	5.56%
Geneva	1,017	820	-19.37%	218,805	183,356	-16.20%
Henry	498	455	-8.63%	169,809	173,986	2.46%
Houston	816	698	-14.46%	197,974	148,526	-24.98%
Pike	600	594	-1.00%	167,271	165,682	-0.95%
Alabama	43,223	40,592	-6.09%	8,902,654	8,580,940	-3.61%
Average for Project Basin	690.22	609.33	**-10.29%**	184,813	157,249	**-13.81%**

4.5.2 Irrigation Status

The current status of irrigation on harvested cropland in the Choc-Pea Basin area is insignificant compared to Alabama's neighboring states. Values for current irrigation status of neighboring states were summarized by USDA NASS in the 2018 report and are available for comparison below in Table 4-5. A map of existing irrigation density by sub-watershed is depicted in Figure 4-11 and locations of existing center pivots within the Choc-Pea Basin are depicted in Figure 4-12 (Handyside, 2017).

Table 4-5. Current Irrigation Status of Harvested Cropland (2018)

[Excludes institutional, research, and experimental farms]	Choc-Pea Basin[1]	Alabama	Georgia	Mississippi	Florida	U.S.
Number of Operations with Irrigation	322	1,069	3,861	1,621	7,615	231,474
Acres Irrigated at least once in the past five years	28,923	163,338	1,163,038	1,667,023	1,331,739	55,938,795

[1]The values listed are summarized for all nine counties within the specified region and may account for the county area that crosses the basin boundary. These values account for the 2017 (most recent) USDA NASS data.

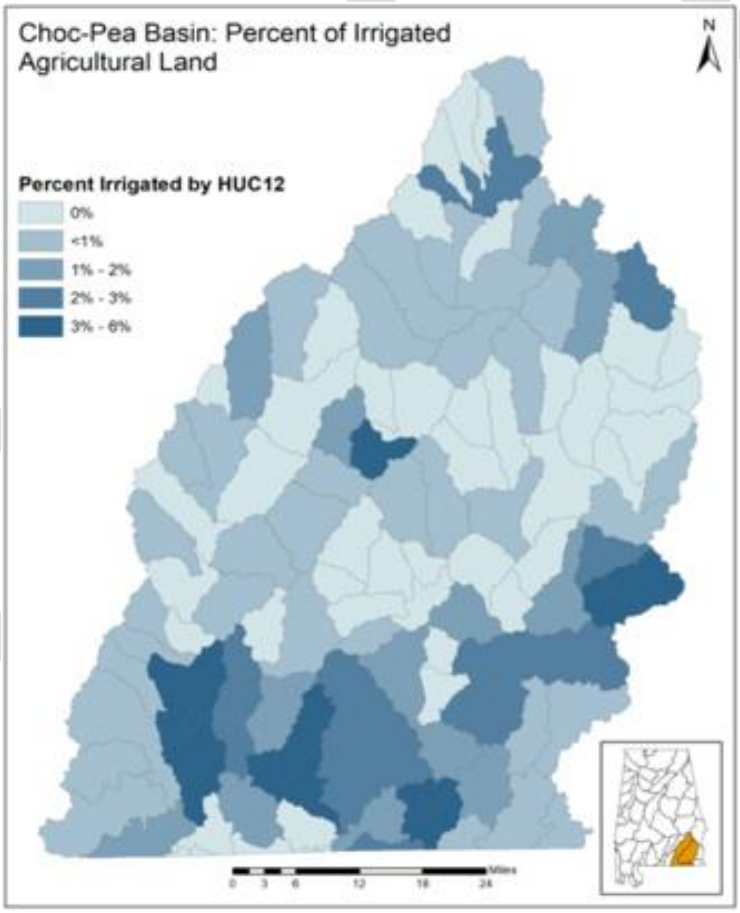

Figure 4-11: Existing Irrigation Density by HUC-12

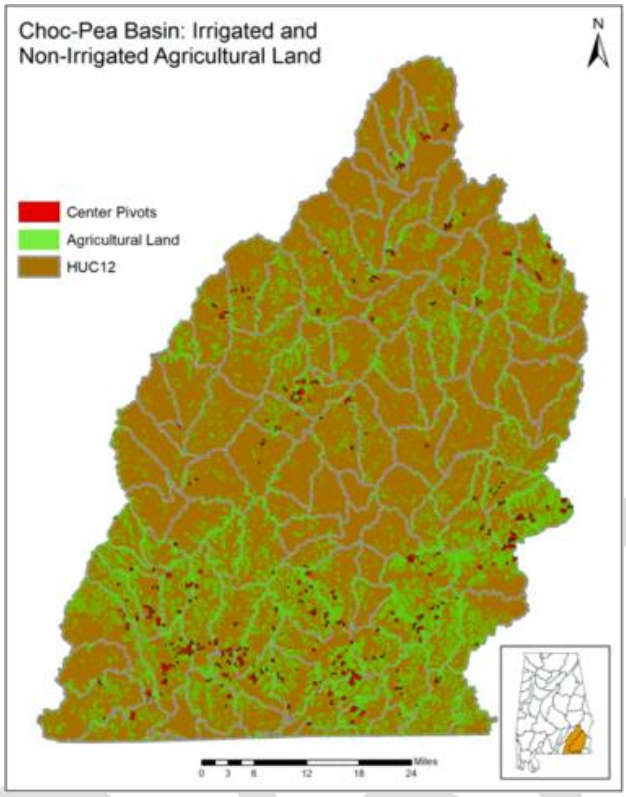

Figure 4-12: Map of Irrigated and Non-Irrigated Agricultural Land

4.5.3 Irrigation Adoption

Using UAH state irrigation survey data from 2006-2015, irrigated acreage has increased in the Choc-Pea Basin from a low of 9,565 acres (about 0.5 percent of the total agriculture area) to 22,171 acres (roughly about 1.44 percent of the total agriculture area) (Handyside, 2017). Most of this increase in irrigated land occurred during 2013-2015 (6,876-acre increase). On average, this depicts a semi-recent adoption trend of approximately 3,151 acres of new irrigated agriculture land per year.

4.5.4 Conservation Practices

The adoption of conservation agricultural practices is promoted throughout the Choc-Pea region through efforts of the NRCS-AL, the Alabama Cooperative Extension System (ACES), and the Alabama Soil and Water Conservation Committee. These efforts include, but are not limited to, Extension and outreach programs and demonstration projects on cover crops, conservation tillage, precision agriculture and irrigation efficiency, farmer listening meetings, and financial assistance for best management practices (BMPs). The ACES, NRCS-AL and ASWCC also focus on and promote VRI and soil health research and education in this basin.

Conservation tillage and cover crop usage in the area was recorded in USDA NASS for the 2017 Census of Agriculture. The values for three categories are shown in Table 4-6. Throughout the nine counties making up the Choc-Pea Basin, approximately 67,218 acres of cropland were operated using conservation tillage (no-till), and 59,303 acres of cover crops were planted on cropland.

Table 4-6. Conservation Tillage and Cover Crop Usage in Choc-Pea Counties (2017)

Counties	Number of Cropland Operations with Conservation Tillage, No-Till[1]	Acres of Cropland with Conservation Tillage, No-Till[1]	Acres of Cropland with Cover Crops Planted[1]
Barbour	49	11,867	4,445
Bullock	8	1,012	940
Coffee	37	8,981	4,526
Covington	59	8,094	12,579
Dale	25	5,013	4,055
Geneva	58	13,126	5,261
Henry	20	5,876	13,390
Houston	23	6,688	11,689
Pike	28	6,561	2,418
Alabama	2,709	765,356	229,097
United States	279,379	104,452,339	15,390,674

[1]The values listed are summarized for all nine counties within the specified region and may account for county areas that go beyond the project basin boundary.

However, when looking at the percentage of land with conservation tillage and cover crops in relation to the number of total harvested acres in the State, Alabama is notably competitive in comparison with neighboring states' use of BMPs (Census of Agriculture, 2019). See Table 4-7 for a comparison in the use of BMPs on harvested cropland.

Table 4-7. Comparison of Conservation Tillage and Cover Crops Planted Between Neighboring States

	Alabama	Mississippi	Georgia	Florida
Total harvested cropland (acres)	2,205,766	4,174,210	3,628,707	2,093,330
Conservation Tillage Present, No-Till (acres)	765,356	637,181	748,083	244,994
Cover Crops Planted (Excluding CRP)	229,097	139,639	530,888	141,848
Percentage of harvested cropland with conservation tillage present	34.7%	15.3%	20.6%	11.7%
Percentage of harvested cropland with cover crops planted	10.4%	3.3%	14.6%	6.8%

4.5.5 Prime Farmland

According to the NRCS, prime farmland is described as "land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is also available for these uses. It has the soil quality, growing season, and moisture supply needed to produce economically sustained high yields of crops when treated and managed according to acceptable farming methods, including water management. In general, prime farmlands have an adequate and dependable water supply from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, acceptable salt and sodium content, and few or no rocks. They are permeable to water and air. Prime farmlands are not excessively erodible or saturated with water for a long period of time, and they either do not flood frequently or are protected from flooding [SSM, USDA Handbook No. 18, October 1993]" (Soil Science Division Staff, 1993).

There are 609,825 acres of prime farmland within the boundaries of the Choc-Pea Basin. This represents approximately 31 percent of the entire basin. There is no agricultural land used to produce

specific high-value food and fiber crops (unique farmland) within the basin. The areas of prime farmland are depicted in Figure 4-13.

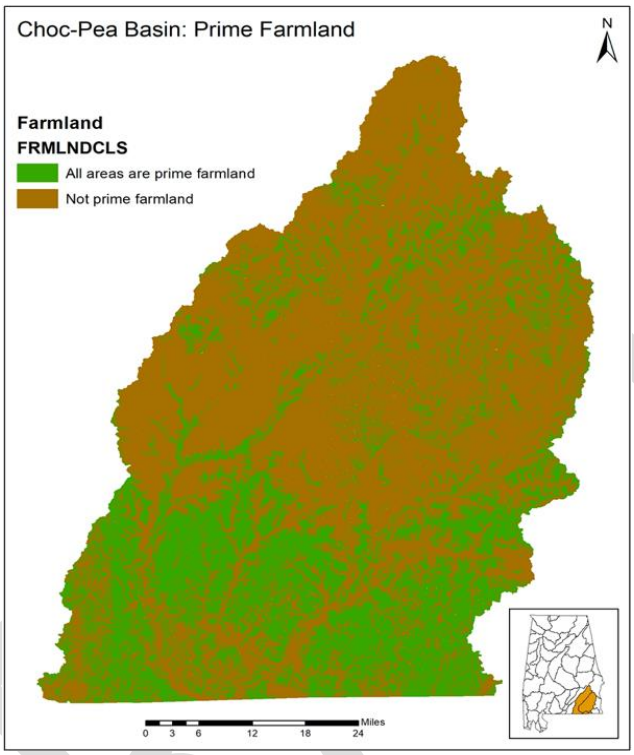

Figure 4-13: Prime Farmland in the Choc-Pea Basin

4.6 Recreation

According to the Outdoor Industry Association (OIA), outdoor recreation generates $14 billion in annual consumer spending and over 130,000 jobs in Alabama. The OIA also states that out-of-state visitors to Alabama spend $5.1 billion on outdoor recreation. The residents of Alabama's 2nd Congressional District, which is the Congressional District associated with the Choctawhatchee-Pea Watersheds, spend $1.24 billion on outdoor recreation every year (OIA, 2017). Camping, fishing, and water sports are the most popular outdoor activities in Alabama's 2nd Congressional District (OIA, 2017). Alabama's 2nd Congressional District is also home to at least six different outdoor companies (OIA, 2017).

4.7 Socioeconomic Resources

Social and economic demographic data such as income, education, and median age were assessed using information from the U.S. Census, USDA National Agricultural Statistics Service, and Bureau of Economic Analysis. This information is depicted in Tables 4-8a and 4-8b below by county. This information was used to assist in identifying areas within the basin area that may need more assistance and outreach in the planning and implementation process, and to estimate project costs to adjust for acreage in the watersheds that may receive historically underserved (HU) cost-share rates for conservation practices. Tables 4-8a and 4-8b present socioeconomic data listed in the most recent U.S. Census Bureau Quick Facts summary (V2019).

4.7.1 General Population

Table 4-8a. Socioeconomic Values for Choc-Pea Basin

County	Barbour	Bullock	Coffee	Covington	Dale
POPULATION AND RACE					
Total Population (2018)	24,881	10,138	51,909	36,986	48,956
Population Percent Change (2010-2017)	-9.40%	-7.10%	3.90%	-2.10%	-2.50%
White Alone	49.10%	26.20%	75.80%	84.50%	73.80%
Minority Population	50.90%	73.80%	24.20%	15.50%	26.20%
AGE					
Total Median Age (2016)	39.70	40.80	39.30	42.90	36.90
Population over 18 years of age	79.10%	78.90%	76.30%	78.10%	77.00%
Population over 65 years of age	19.40%	16.40%	17%	21.10%	16.90%
LANGUAGE SPOKEN AT HOME					
Total Households	9,191	3,670	19,620	15,285	18,825
Language other than English spoken at home	5.70%	2.80%	6.40%	1.40%	4.90%

Table 4-8a. Socioeconomic Values for Choc-Pea Basin

County	Barbour	Bullock	Coffee	Covington	Dale
EDUCATIONAL ATTAINMENT					
High School Graduate (%)	73.10%	71.40%	85.40%	82.00%	86.00%
Bachelor's degree or higher	12.00%	13.40%	22.70%	15.50%	16.80%
EMPLOYMENT					
Total Employment, 2016	6,857	2,097	13,388	10,187	11,146
INCOME					
Median Household Income	$33,368	$29,655	$49,821	$39,467	$44,711
Per Capita Income	$33,453.00	$27,500.00	$42,076.00	$34,785.00	$35,834.00
POVERTY					
Population below Poverty Level	33.40%	34.40%	15.50%	17.70%	17.70%

Table 4-8b. Socioeconomic Values for Choc-Pea Basin, the State of Alabama, and the United States

County	Henry	Houston	Geneva	Pike	Alabama	U.S.
POPULATION AND RACE						
Total Population	17,209	104,722	26,314	33,338	4,887,871	327,167,434
Population Percent Change (2010-2017)	-0.50%	3.10%	-1.80%	1.30%	2.30%	6.00%
White Alone	71.40%	69.10%	87.20%	57.50%	69.10%	76.50%
Minority Population	28.60%	30.90%	12.80%	42.50%	30.90%	23.50%

Table 4-8b. Socioeconomic Values for Choc-Pea Basin, the State of Alabama, and the United States

County	Henry	Houston	Geneva	Pike	Alabama	U.S.
AGE						
Total Median Age	43.20	39.30	42.00	31.20	39.00	37.90
Population over 18 years of age	79.40%	77.00%	78.10%	81.00%	77.70%	77.60%
Population over 65 years of age	22.70%	17.80%	20.30%	15%	16.90%	16.00%
LANGUAGE SPOKEN AT HOME						
Total Households	6,727	39,560	10,693	12,284	1,856,695	118,825,921
Language other than English spoken at home (2013-2017)	2.10%	3.80%	3.40%	4.30%	5.10%	21.30%
EDUCATIONAL ATTAINMENT						
High School Diplomas	80.60%	85.30%	79.00%	81.10%	85.30%	87.30%
Advanced Education	17.10%	20.90%	11.10%	24.70%	24.50%	30.90%
EMPLOYMENT						
Employed	2,513	43,799	3,934	11,135	1,673,249	126,752,238
INCOME						
Median Household Income	$45,569	$42,803	$39,293	$35,684	$46,472	$57,652
Per Capita Income	$39,459	$40,878	$33,958	$36,225	$40,805	$51,640
POVERTY						
Population below Poverty Level	17.00%	16.60%	21.70%	27.70%	16.90%	12.30%

4.7.2 Agricultural Statistics

Table 4-9 depicts the farm operator demographics in reference to the Choc-Pea project area, Alabama, and the United States.

Table 4-9. Farm Operator Demographics

	Project Area	Alabama	United States
# of Principal Operators	7,159	53,063	2,740,453
# of All Operators	8,767	64,742	3,447,028
Full-time Principal operators (%)	40.00%	40.20%	44.06%
Part-time Principal operators (%)	60.00%	59.80%	55.94%
% of Minority operators[1]	29.60%	37.00%	29.40%

[1]Minority farmers were determined to be any farmer other than Caucasian males, as defined by the USDA Economic Research Service ("Socially Disadvantaged Farmers: Race, Hispanic Origin, and Gender," 2017).

An important factor in irrigation efficiency is when the farmer chooses to irrigate their field. Table 4-10 below depicts survey data from the 2013 NASS report of methods used in deciding when to irrigate in the State of Alabama. The majority of respondents reported the condition of the crop and feel of the soil as the most relied on methods for determining when to irrigate their fields.

Table 4-10. Methods Used in Deciding When to Irrigate: 2013

Methods Used in Deciding When to Irrigate - Alabama: 20183	
Farms reporting method used (Respondents could choose more than one method)	**Number of Respondents** (Respondents could choose more than one method)
All Farms with Irrigation	1,069
Condition of Crop	991
Feel of Soil	452
Soil moisture sensing device	82
Plant moisture sensing device	2
Commercial or government scheduling service	11
Reports on daily crop-water evapotranspiration (ET)	7

Table 4-10. Methods Used in Deciding When to Irrigate: 2013

Methods Used in Deciding When to Irrigate - Alabama: 20183	
Farms reporting method used (Respondents could choose more than one method)	**Number of Respondents** (Respondents could choose more than one method)
Scheduled by water delivery organization	27
Personal calendar schedule	100
Computer simulation models	N/A
When neighbors begin to irrigate	11

Furthermore, the 2018 NASS Report captured responses from farmers who discontinued irrigation on their farms, and the reasoning behind their choices. Out of the 408 respondents to this survey, approximately 126 reported the discontinuance to be permanent. The majority of the respondents reported "sufficient soil moisture" as their main reason for discontinuing irrigation on their farms. The next highest response was "irrigation is uneconomical". Table 4-11 depicts the results of this survey.

Table 4-11. Reasons for Discontinuing Irrigation

Reasons for Discontinuing Irrigation - Alabama 2018	
Reasons for Discontinuing Irrigation	**Number of Respondents**
All farms reporting discontinued irrigation from previous year	408
Farms reporting discontinuance to be permanent	126
Sufficient soil moisture	308
Shortage of surface water	N/A
Shortage of groundwater	50
Irrigation is uneconomical	100
Loss of Water Rights	N/A

Table 4-11. Reasons for Discontinuing Irrigation

Reasons for Discontinuing Irrigation - Alabama 2018	
Reasons for Discontinuing Irrigation	**Number of Respondents**
Sold or leased water rights or annual water allocation	N/A
Restrictions on water use	N/A
Converted to non-agricultural uses	N/A
Converted to agricultural enterprise not requiring irrigation	N/A
Available surface water too salty	N/A
Other or unspecified	25

4.8 Vegetation

The East and West Forks of the Choctawhatchee River flow through areas with more species of trees than any other forest in temperate North America (CPYRWMA, n.d.). Forests cover about 43 percent of the Choctawhatchee River Watershed and about 53 percent of the Pea River watershed. However, a combined total of 49 percent forested land is within the Alabama state boundary.

Approximately 26 percent of the Choctawhatchee River watershed and 18 percent in the Pea River watershed is made up of pasture and cropland (CPYRWMA, n.d.). The percentage identified within the State boundary for the combined basin is 23.2 percent of agricultural land.

4.8.1 Agricultural Crops

The nine counties that span this basin's area is one of the largest agricultural producing regions in the state. According to USDA's AgCensus, these counties account for 18 percent of the state agricultural sales. Houston county is ranked 1st in the state for the value of vegetables, melons, potatoes, and sweet potatoes grown, as well as in acreage for peanuts and harvested vegetables (USDA, 2017). Of the nine counties, three are ranked 1st, 2nd, and 3rd in the state in market value of other crops and hay; other crops and hay is defined by the USDA-NASS as follows: "Data are for the total market value of all crops not categorized into one of the prelisted crop sales categories on the report form. This category includes crops such as grass seed, hay and grass silage, haylage, green chop, hops, maple syrup, mint for oil, peanuts, sugarcane, sugar beets, etc." (USDA NASS, 2017). Other popular crops grown in this basin include cotton, hay, peanuts, soybeans, wheat, and corn.

4.8.3 Noxious Weeds and Invasive Species

There are 141 plant species that Alabama has listed as legally noxious (USDA, n.d.). The Alabama Invasive Plant Council lists 65 plant species that are considered invasive in Alabama, which includes 10 species of trees; 18 species of shrubs; eight grasses, grass-likes and canes; nine forbs; and 10 species of aquatic and wetland plants (Alabama Invasive Plant Council, 2012). Of these species, 47 have been reported on EDDMapS (2020) in counties that are part of the Choc-Pea Basin (Table 4-12). Nine of these species are included on "Alabama's 10 Worst Invasive Weeds" list (Alabama Invasive Plant Council, 2012).

Table 4-12. List of Invasive Plant Species Occurring in the Choc-Pea Basin

	Common Name	Scientific Name
Trees	Tree-of-heaven	*Ailanthus altissima*
	Silktree	*Albizia julibrissin*

Table 4-12. List of Invasive Plant Species Occurring in the Choc-Pea Basin

	Common Name	Scientific Name
	Chinese parasol	*Firmiana simplex*
	Chinaberry	*Melia azedarach*
	Princess tree	*Paulownia tomentosa*
	Trifoliate orange, hardy orange	*Poncirus trifoliata*
	Callery pear "Bradford"	*Pyrus calleryana*
	Tallowtree[1]	*Triadica sebifera*
	Tungoil tree	*Vernicia fordii*
Shrubs	Thorny olive	*Elaeagnus pungens*
	Lantana	*Lantana camara*
	Shrubby lespedeza	*Lespedeza bicolor*
	Glossy privet	*Ligustrum lucidum*
	Japanese privet	*Ligustrum japonicum*
	Chinese privet[1]	*Ligustrum sinense*
	Nandina, sacred bamboo	*Nandina domestica*
	Macartney rose	*Rosa bracteata*
	Cherokee rose	*Rosa laevigata*
	Multiflora rose[1]	*Rosa multiflora*
	Tropical soda apple[1]	*Solanum viarum*
Vines	Sweet autumn virginsbower	*Clematis terniflora*
	English ivy	*Hedera helix*
	Japanese honeysuckle	*Lonicera japonica*
	Japanese climbing fern[1]	*Lygodium japonicum*
	Kudzu[1]	*Pueraria montana var. lobata*
	Bigleaf periwinkle	*Vinca major*

Table 4-12. List of Invasive Plant Species Occurring in the Choc-Pea Basin

	Common Name	Scientific Name
	Chinese wisteria	*Wisteria sinensis*
Grasses, grass-likes, and canes	Giant reed	*Arundo donax*
	Pampas grass	*Cortaderia selloana*
	Cogongrass[1]	*Imperata cylindrica*
	Japanese stiltgrass, Nepalese browntop	*Microstegium vimineum*
	Torpedo grass	*Panicum repens*
	Vaseygrass	*Paspalum urvillei*
	Golden bamboo	*Phyllostachys aurea*
	Johnsongrass	*Sorghum halepense*
Forbs	Wild taro, coco yam, elephant ears	*Colocasia esculenta*
	Hairy crabweed, mulberry weed	*Fatoua villosa*
	Chinese lespedeza	*Lespedeza cuneata*
	Asiatic dewflower, wartremoving herb	*Murdannia keisak*
	Chamber bitter	*Phyllanthus urinaria*
	Rattlebox, scarlet wisteria	*Sesbania punicea*
Aquatic and wetland plants	Alligatorweed[1]	*Alternanthera philoxeroides*
	Brazilian elodea	*Egeria densa*
	Common water hyacinth	*Eichhornia crassipes*
	Hydrilla, waterthyme[1]	*Hydrilla verticillata*
	Parrot feather watermilfoil	*Myriophyllum aquaticum*
	Water lettuce	*Pistia stratiotes*

[1] Species is included on "Alabama's 10 Worst Invasive Weeds" list

4.9 Water Resources

4.9.1 Water Quantity

There are approximately 16,154 acres of open water within the Choc-Pea Basin. The Choctawhatchee River originates as two separate forks (East Fork and West Fork) in wetlands near Clayton in Barbour County. Near Ozark in central Dale County, the forks merge to form the Choctawhatchee River which flows southeast for about 48 miles to Geneva. As stated previously, the Choctawhatchee River is one of the longest free-flowing rivers remaining in Alabama and drains an area of 3,484 square miles. Its main tributary, the Pea River, joins the Choctawhatchee just below Geneva near the Florida state line.

The Pea River watershed drains the area immediately west of the Choctawhatchee River and begins in Bullock County south of Union Springs. The Pea River flows southwestward for approximately 68 miles to Elba (northwest Coffee County), southward for 30 miles into Geneva County, then gradually eastward briefly flowing into Florida before joining the Choctawhatchee River south of Geneva. The total length of the Pea River is 128 miles and drains an area of 1,452 square miles.

4.9.1.1 Groundwater Quantity

Much of the material given in this section relies primarily on groundwater and surface water assessments for Alabama completed by the Alabama Geological Survey (Assessment of Groundwater Resources in Alabama, 2010-16, Bulletin 186, 2018) and the Alabama Department of Water Resources (Alabama Surface Water Assessment Report, 2017).

According to the Geological Survey report, the physiography underlying the Choctawhatchee-Pea Basin is contained within the East Gulf Coastal Plain groundwater province in Alabama.

The Choc-Pea Basin contains a number of aquifer recharge zones, as illustrated in Figure 4-14. Seven aquifers are suitable for production, and contour maps for each of these aquifers are included below (Figures 4-15 to 4-19).

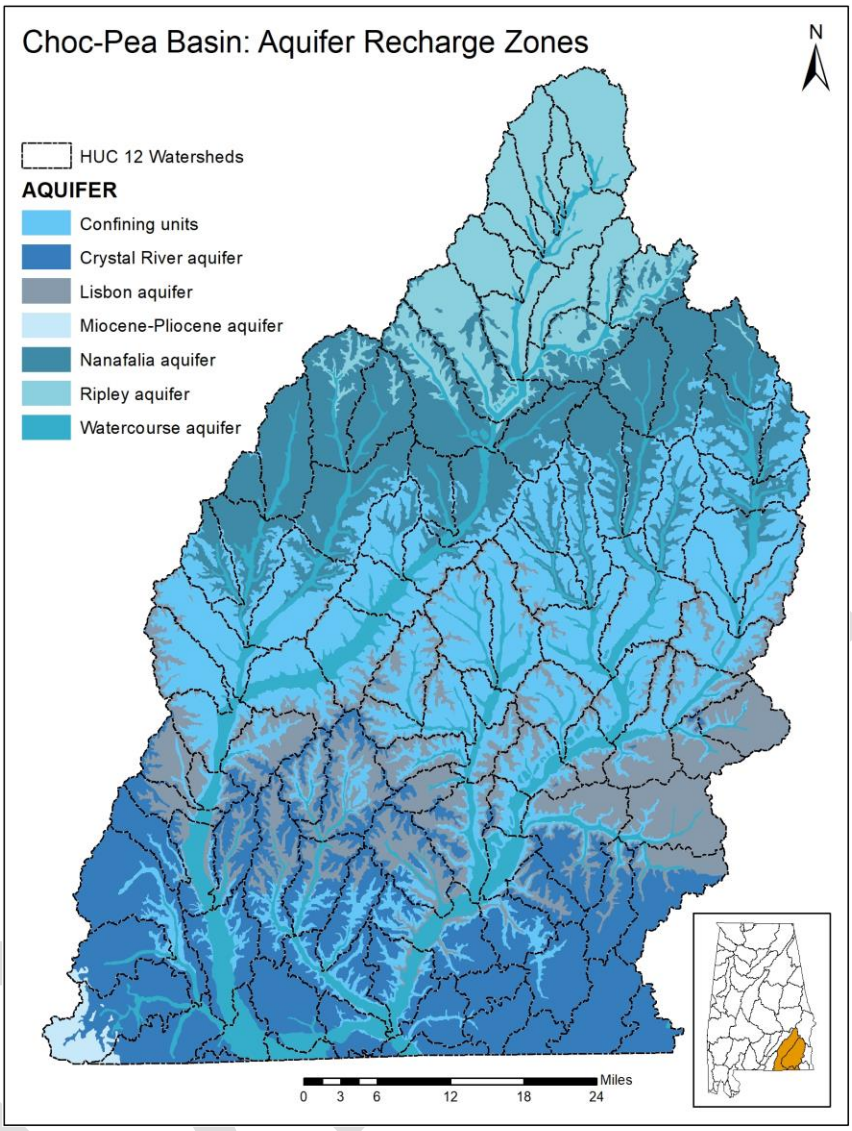

Figure 4-14: Aquifer Recharge Zones Within the Choc-Pea Basin

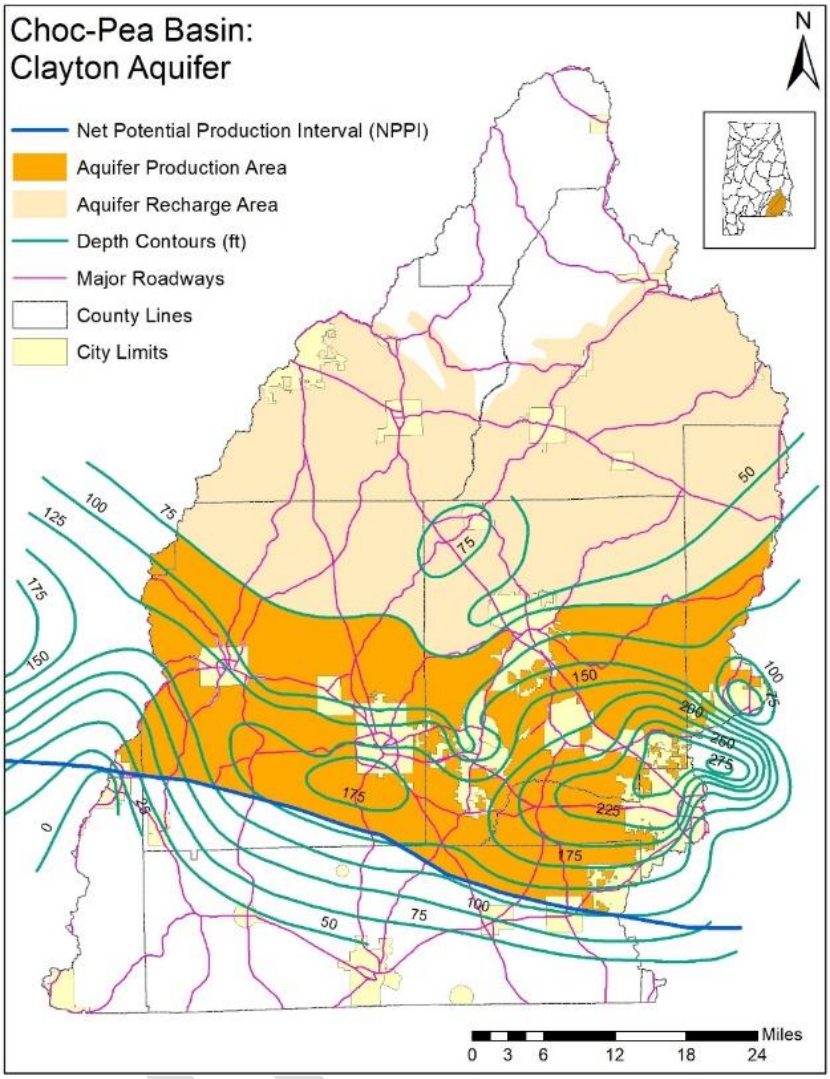

Figure 4-15: Clayton Aquifer Within the Choc-Pea Basin

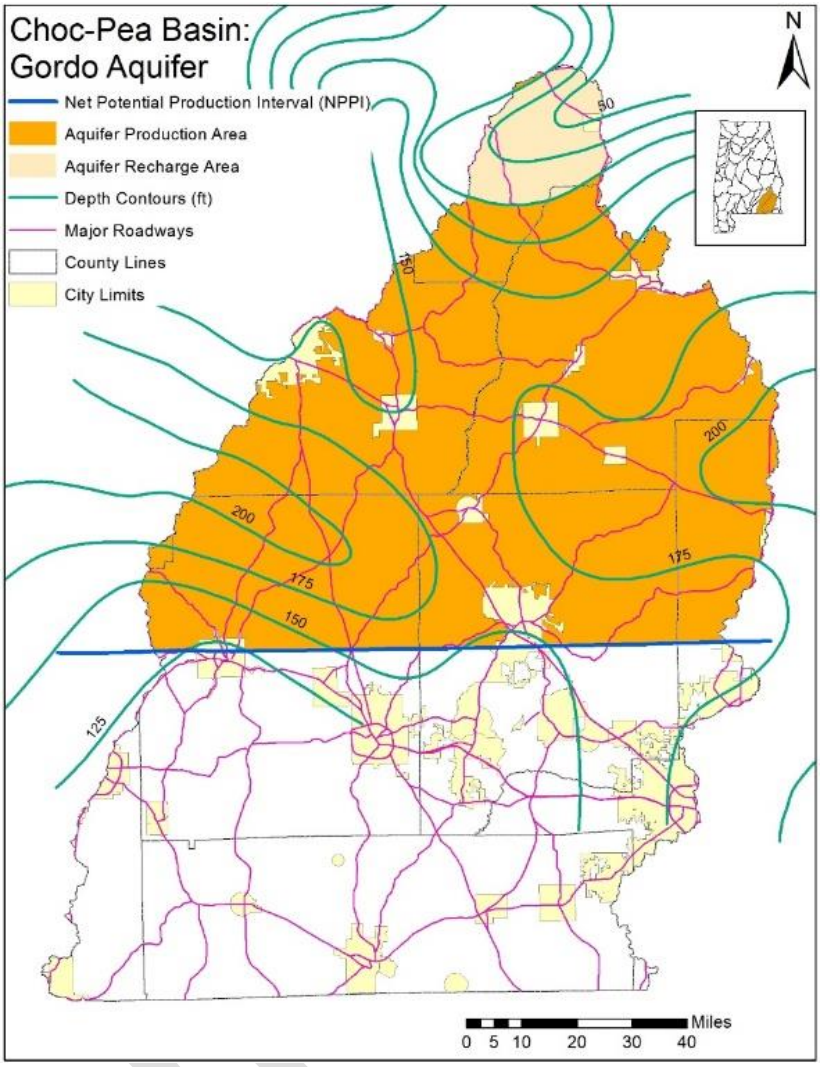

Figure 4-16: Gordo Aquifer Within the Choc-Pea Basin

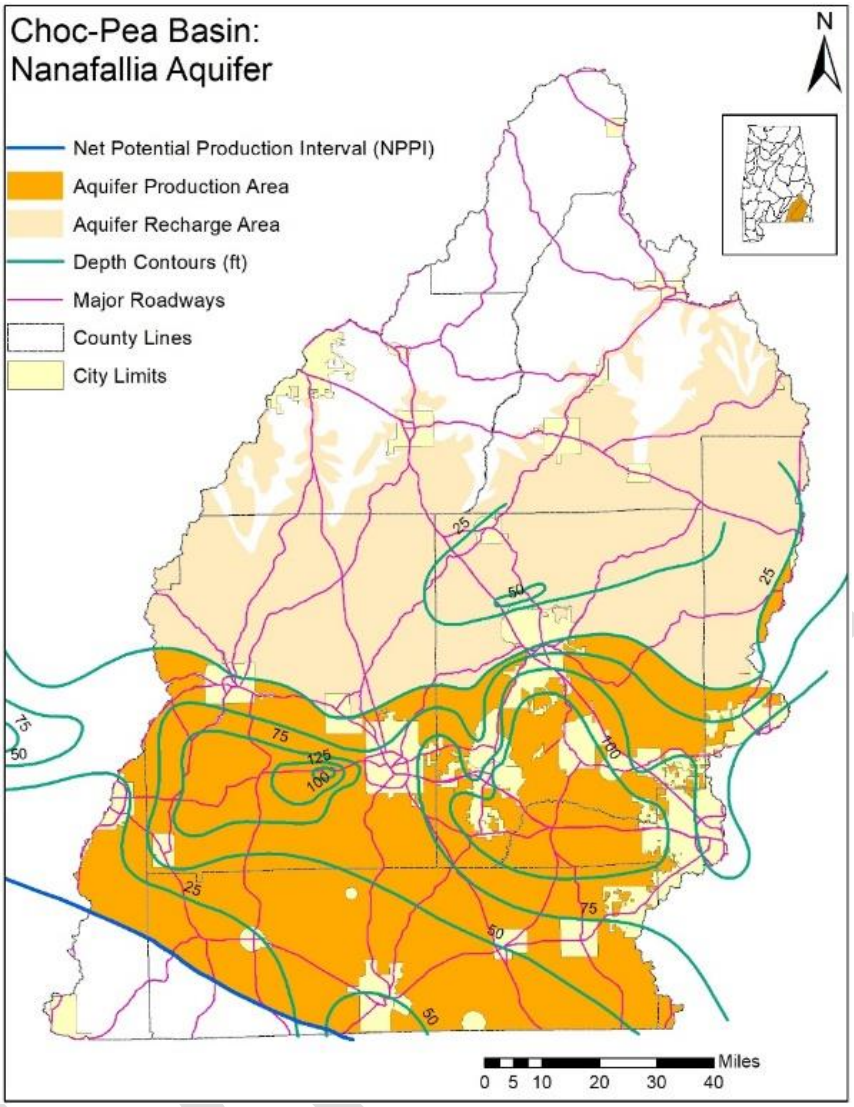

Figure 4-17: Nanafalia Aquifer Within the Choc-Pea Basin

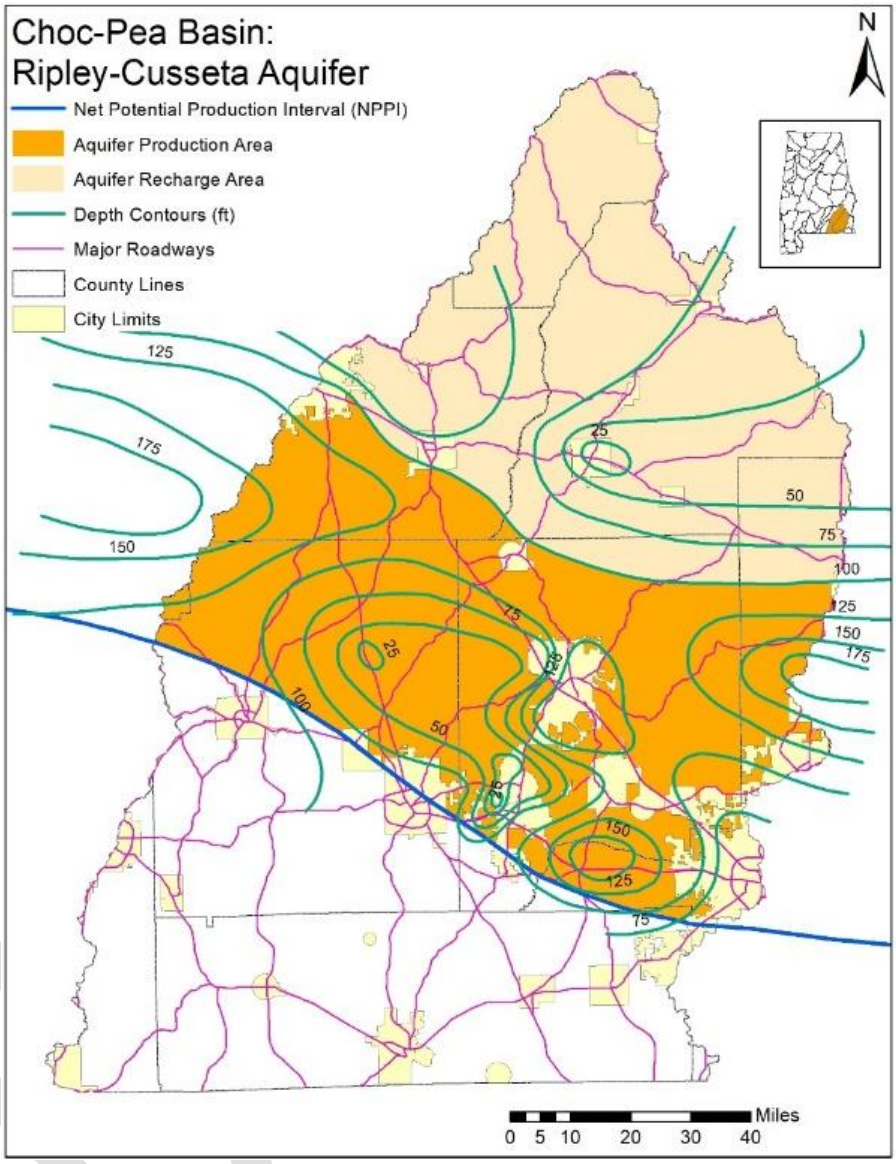

Figure 4-18: Ripley-Cusseta Aquifer Within the Choc-Pea Basin

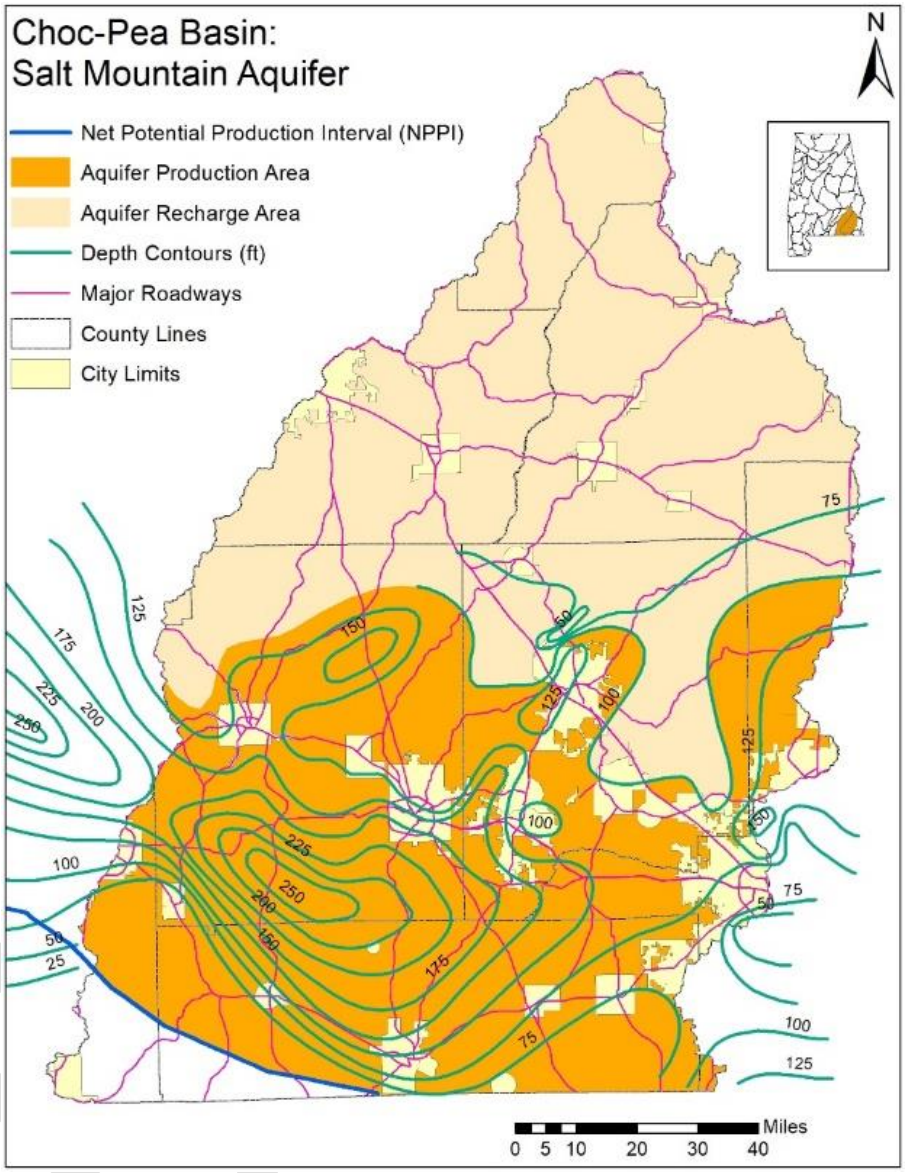

Figure 4-19: Salt Mountain Aquifer Within the Choc-Pea Basin

Table 4-13 summarizes relevant data regarding depth, pumping rate, and specific capacity of each aquifer. All of these aquifers are generally confined with well depths varying from a minimum of 18 feet (ft.) in Ripley to a maximum of 2,070 ft. in the Nanafalia aquifer, while depth to water ranged from 0 ft. to 390 ft. Pumping rates vary from 3 to 1,200 gallons per minute (gpm), both in the Ripley Aquifer, while specific capacities vary from less than 1 gpm/ft. in the Ripley and Lisbon aquifers to 46.7 gpm/ft. in the Lisbon aquifer.

Where available (otherwise the table is marked N/A), well drawdown curves are given in the Alabama Geological Survey report and are used to determine if the aquifer has been declining, increasing, or stable over time. The report also notes whether there are any discernible drawdowns due to large pumping operations, which is also noted in the table.

Table 4-13. Information on Major Aquifers in the Choc-Pea Basin

Aquifer Name	Primary Production Area	Depth of Well	Depth to Water	Issues	Well Spacing
Gordo	Southwestern Bullock, northeastern Pike, southwestern Barbour, northern Coffee, Dale, and Henry Counties	Range from 1,100 ft in northwestern Bullock County to 2,800 ft in northern Dale County	Ranges generally from 325 ft below land surface (BLS) in south-central Bullock County to 367 ft BLS in northern Dale County to 200 ft BLS in west Dothan	Excessive concentrations of chloride are found in the Gordo in down gradient parts of the region.	Spacing of large diameter (8 to 10-inch or larger), high capacity wells are 1.5 miles along formation strike and 2.0 miles in the dip or downgradient direction. Spacing of four and six-inch diameter wells can be significantly less and may be tens of feet apart with no observed interference.
Ripley	Central Barbour; southwestern and south-central Pike; extreme southeastern Pike; northern, central, eastern, and south-central Dale; central and southern Henry; and the panhandle of western Houston Counties	Range from 200 to 500 ft BLS in central Barbour; 500 to 700 ft BLS in southwestern and south-central Pike; 700 ft BLS in extreme southeastern Pike; 800 to 900 ft BLS in north-central and central Dale; 700 to 900 ft BLS in eastern Dale; and 1,100 to 1,300 ft BLS in south-central Dale and the	Ranges generally from 50 to 100 ft BLS in central Barbour; 250 to 350 ft BLS in southwestern and south-central Pike; 400 ft BLS in extreme southeastern Pike; 300 to 400 ft BLS in north-central and central Dale; 200 to 250 ft BLS in eastern Dale; 150 to 250 ft BLS in south-central Dale and the panhandle of western Houston	Excessive concentration of iron occurs in Barbour and Pike Counties. Excessive concentrations of chloride are found in the Ripley in downgradient parts of the region.	Spacing of large diameter (8 to 10 inch or larger), high production wells have a minimum spacing recommended to be 1.0 mile along formation strike (west) and 2.5 miles in the dip or down gradient direction (north). Spacing for four and six-inch diameter wells can be significantly less and may be tens of feet apart with no observed interference.

Table 4-13. Information on Major Aquifers in the Choc-Pea Basin

Aquifer Name	Primary Production Area	Depth of Well	Depth to Water	Issues	Well Spacing
		panhandle of western Houston			
Clayton	Southern Coffee; southern Dale; southwestern Henry; northwestern Houston; northeastern Geneva Counties	Range from 500 ft along the northern margin of the primary production trend to 1,100 ft along the southern margin.	Ranges generally from 100 to 250 ft BLS in southern Coffee County; about 200 ft BLS in southern Dale; 200 to 250 ft BLS in southwest Henry; 200 to 300 ft BLS in western Houston; 300 to 400 ft BLS in northeastern Geneva County	Chloride concentrations are above drinking water standards (250 mg/L) across southern Houston, northeastern Geneva, south-central and southwestern Coffee and central Covington counties.	Spacing of large diameter (8 to 10-inch or larger), high production capacity wells have a minimum spacing recommended to be 1.0 miles along formation strike (east-west) and 2.0 miles in the dip or downgradient direction (north-south). Spacing of four and six-inch diameter wells can be significantly less and may be tens of feet apart with no observed interference.
Salt Mountain	Northeast Covington; southern Coffee; southwestern Dale, and north-central Geneva counties. There are also three isolated, productive areas northeast of the main productive trend in north-central Coffee, northeastern	Range from 600 ft in the potentially productive areas north of the primary productive trend to 1,100 ft in Geneva County.	Generally, range from 100 ft BLS in northern Coffee County, 300 ft BLS in Southern Coffee, to 45 ft above land surface at the town of Geneva in south-central Geneva County.	Chloride concentrations above drinking water standards (250 mg/L) are found across central Covington, southwestern Coffee, and central Geneva Counties.	Spacing of large diameter (8 to 10-inch), high production capacity wells have a minimum spacing recommended to be 1.0 miles along formation strike (east-west) and 2.0 miles in the dip or downgradient (north-south). Spacing of four and six-inch diameter wells can be significantly less and may be tens of feet apart with no observed interference.

Table 4-13. Information on Major Aquifers in the Choc-Pea Basin

Aquifer Name	Primary Production Area	Depth of Well	Depth to Water	Issues	Well Spacing
	Dale, and northwestern Houston Counties.				
Nanafalia	Northern Covington; southern Coffee; southern and central Dale; northwestern Houston Counties`	Range from 400 to 800 ft in the primary productive trend in Coffee County, 300 to 800 ft in Dale County, and 700 to 850 ft in Houston County	Ranges generally from 25 to 150 ft BLS in southern Coffee County, 50 to 250 ft BLS in southern and central Dale counties, and 150 to 300 ft BLS in northwestern Houston County	In the west part of the Nanafalia aquifer, it has an increasing amount of lignite. There are also chloride concentrations above drinking water standards (250 mg/L) across central Covington, northwestern and south-central Geneva Counties.	Spacing of large diameter (8 to 10-inch), high production capacity wells have a minimum spacing recommended to be 1.0 miles along formation strike (east-west) and 2.0 miles in the dip or downgradient direction (north-south). Spacing of four and six-inch diameter wells can be significantly less and may be tens of feet apart with no observed interference.
Lisbon	Central Geneva County northeastward through southern Dale and northeastern Houston counties.	Range from 85ft in southeastern Dale County to 500 ft in south-central Geneva County	Ranges generally from 60 to 90 ft BLS in central Geneva County to 20 ft BLS in southwestern Henry County	N/A	Spacing of large diameter (8 to 10-inch), high production capacity wells have a minimum spacing recommended to be 1.0 miles along formation strike (east-west) and 1.0 miles in the dip or downgradient direction (north-south). Spacing of four and six-inch diameter wells can

Table 4-13. Information on Major Aquifers in the Choc-Pea Basin

Aquifer Name	Primary Production Area	Depth of Well	Depth to Water	Issues	Well Spacing
					be significantly less and may be tens of feet apart with no observed interference.
Crystal River	Central Geneva County northeastward through southern Dale and northeastern Houston Counties	Range from 50 ft to 300 ft across the productive area	Ranges generally from 15 to 40 ft BLS in southern Houston County and 20 to 95 ft BLS in southern Geneva County	N/A	Spacing of large diameter (8 to 10-inch), high production capacity wells have a minimum spacing recommended to be 1.0 miles along formation strike (east-west) and 1.0 miles in the dip or downgradient direction (north-south). Spacing of four and six-inch diameter wells can be significantly less and may be tens of feet apart with no observed interference.

Well data regarding uses for irrigation, municipal supply, and non-public use has been compiled by the GSA and locations of known wells can be seen in Figure 4-20.

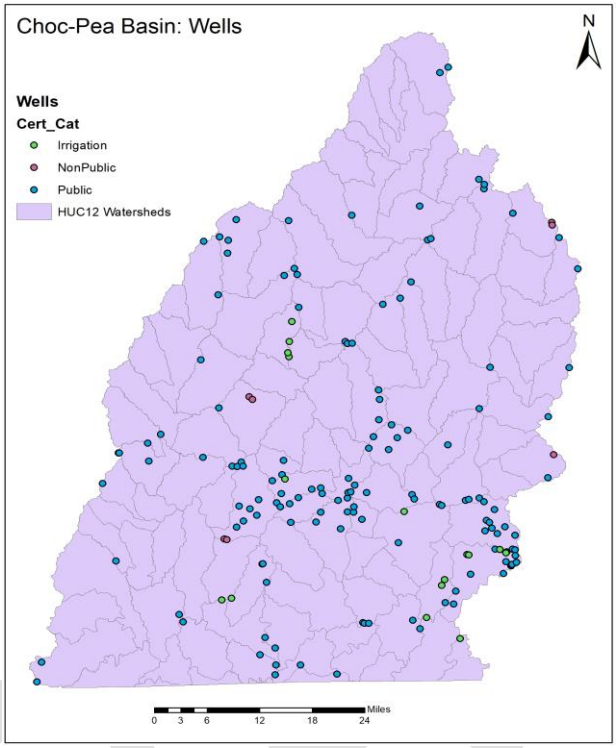

Figure 4-20: Location of Wells Within Choc-Pea Basin

Groundwater recharge is normally estimated by separating the base flow from the runoff portion of surface water hydrographs. The base flow is then related to the groundwater recharge in the aquifer that is contributing to the streamflow. The Alabama Geological Survey recharge estimates are based on four hydrograph separation methods of varying degrees of complexity. They varied from using only days when base flow was known to be unaffected by rainfall/runoff, to merely connecting the minimum flows, to using long term base flow-to-total runoff ratios. Annual recharge rates computed by the Alabama Geological Survey for the major water bearing aquifers in the Choc-Pea Basin are given in Table 4-14.

Table 4-14. Annual Recharge Rates for the Major Aquifers in the Choc-Pea Basin

Aquifer	Annual Recharge (in)
Ripley	4.82
Crystal River	11.75
Lisbon & Gosport Sand	8.40
Lisbon	12.60
Nanafalia	10.70

Groundwater withdrawals account for approximately 73 percent of the total withdrawal budget for the basin area (as shown in Table 4-15). However, agriculture only accounts for about 25 percent of total groundwater withdrawals in the Upper Choctawhatchee and 35 percent of total groundwater withdrawals in the Pea Watershed.

Extensive research into the formation, storage, recharge and drawdown of groundwater in this basin has been conducted by the Geological Survey of Alabama. The report (Cook, 2014) provides critical information into the current and future development of groundwater resources. Sustainable groundwater yield is defined as: “The groundwater extraction regime, measured over a specified planning timeframe that allows acceptable levels of stress and protects dependent economic, social, and environmental values.” (Cook, 2014). Any aquifer stress in this region is generally located near population centers where municipalities use high capacity wells within close proximity. Even these areas of relatively higher demand have no identifiable levels of unacceptable stress (Cook, 2014).

Table 4-15. Total Groundwater Withdrawal Budget for Choc-Pea Basin

Month	Basin All Withdrawals (MGD)	Basin All Withdrawals (in)	Basin GW Withdrawals (MGD)	Basin GW Withdrawals (in)	GW Percentage of All Withdrawals
Jan	36.68	0.0207	30.72	0.0173	83.75%
Feb	37.34	0.0190	30.68	0.0156	82.16%
March	43.38	0.0245	35.19	0.0199	81.12%
April	50.32	0.0275	37.31	0.0204	74.15%
May	61.77	0.0349	43.62	0.0246	70.62%
June	75.61	0.0413	49.20	0.0269	65.07%
July	79.88	0.0451	50.35	0.0284	63.03%

Aug	71.76	0.0405	48.04	0.0271	66.95%
Sept	64.48	0.0352	46.64	0.0255	72.33%
Oct	52.09	0.0294	38.86	0.0219	74.60%
Nov	40.72	0.0223	32.70	0.0179	80.30%
Dec	37.73	0.0213	31.58	0.0178	83.70%
Total	651.76	0.3618	474.89	0.2635	72.86%

4.9.1.2 Surface Water Quantity

The portions of the Upper/Lower Choctawhatchee and Pea watersheds located within Alabama comprise 3,122 square miles. The mean monthly flow of the three watersheds are shown in Table 4-16 in units of cubic feet per second (cfs). It should be noted that Alabama does not currently regulate in-stream flow, and has no law or regulations prescribing flow standards.

Table 4-16. Average Surface Water Flows (cfs) for the three watersheds in the Choc-Pea Basin

Month	Upper Choctawhatchee Monthly Flow Statistics (CFS)	Pea Monthly Flow Statistics (CFS)	Lower Choctawhatchee Monthly Flow Statistic (CFS)
January	2,813	3,213	6,025
February	3,324	4,448	7,772
March	3,825	4,985	8,810
April	2,908	3,999	6,907
May	1,646	2,364	4,010
June	1,316	1,894	3,210
July	1,712	2,315	4,028
August	1,216	1,862	3,078
September	970	1,353	2,323
October	1,048	1,444	2,492
November	1,416	1,563	2,979
December	2,228	2,467	4,695

The water budget report (Harper et al., 2015) shown in Tables 4-17, 4-18, and 4-19 shows that surface water accounts for approximately 27 percent of total withdrawals in the basin (Upper Choctawhatchee and Pea) and 28 percent of total withdrawals for the Lower Choctawhatchee. The budget includes all sector withdrawals with the returns shown separately.

Table 4-17. Upper Choctawhatchee River - Demand Data (2010)

2010 Demands- Upper Choctawhatchee River														
Withdrawals (MGD)														
Category	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**AVG**	**Percentage**
Agriculture-GW	0.81	1.05	1.36	2.57	4.48	7.56	8.45	6.18	3.65	2.40	1.15	0.86	3.38	25%
Agriculture-SW	4.62	5.05	6.11	9.20	12.32	17.32	19.36	15.95	12.40	9.36	6.07	4.71	10.21	75%
Ag-Total	5.43	6.10	7.47	11.77	16.80	24.88	27.81	22.13	16.05	11.76	7.22	5.57	13.59	100%
Total-SW	**4.68**	**5.11**	**6.17**	**9.26**	**12.38**	**17.38**	**19.42**	**16.01**	**12.46**	**9.42**	**6.13**	**4.77**	**10.26**	**27%**
Total-GW	**20.75**	**20.77**	**24.97**	**25.36**	**30.37**	**34.33**	**34.72**	**33.25**	**32.70**	**26.77**	**22.30**	**21.69**	**27.33**	**73%**
Total	**25.43**	**25.88**	**31.14**	**34.62**	**42.75**	**51.71**	**54.14**	**49.26**	**45.16**	**36.19**	**28.43**	**26.46**	**37.59**	**100%**
Ag GW%	**4%**	**5%**	**5%**	**10%**	**15%**	**22%**	**24%**	**19%**	**11%**	**9%**	**5%**	**4%**		
Ag SW%	**99%**	**99%**	**99%**	**99%**	**100%**	**100%**	**100%**	**100%**	**100%**	**99%**	**99%**	**99%**		
Returns (MGD)														
Category	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**AVG**	
Agriculture	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Total Returns	22.80	25.96	17.56	13.92	15.30	14.62	14.35	14.76	12.85	12.76	13.96	12.61	15.95	

Table 4-18. Pea River - Demand Data (2010)

2010 Demands- Pea River														
Withdrawals (MGD)														
Category	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**AVG**	**Percentage**
Agriculture- GW	0.75	0.86	1.11	1.92	2.67	3.96	4.41	3.42	2.57	1.94	1.07	0.82	2.12	35%
Agriculture-SW	1.10	1.34	1.76	3.30	5.14	8.11	9.09	6.91	4.78	3.34	1.64	1.18	3.97	65%
Ag-Total	1.85	2.20	2.87	5.22	7.81	12.07	13.50	10.33	7.35	5.28	2.71	2.00	6.09	100%
Total -SW	**1.13**	**1.37**	**1.78**	**3.33**	**5.17**	**8.14**	**9.12**	**6.94**	**4.81**	**3.37**	**1.66**	**1.21**	**4.00**	**27%**
Total-GW	**9.10**	**9.10**	**9.33**	**10.82**	**11.88**	**13.12**	**13.82**	**13.24**	**12.54**	**10.97**	**9.48**	**9.03**	**11.03**	**73%**
Total	**10.23**	**10.47**	**11.11**	**14.15**	**17.05**	**21.26**	**22.94**	**20.18**	**17.35**	**14.34**	**11.14**	**10.24**	**15.03**	**100%**
Ag GW%	**8%**	**9%**	**12%**	**18%**	**22%**	**30%**	**32%**	**26%**	**20%**	**18%**	**11%**	**9%**		
Ag SW%	**97%**	**98%**	**99%**	**99%**	**99%**	**100%**	**100%**	**100%**	**99%**	**99%**	**99%**	**98%**		
Returns (MGD)														
Category	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**AVG**	
Agriculture	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Total Returns	8.48	7.87	7.79	6.96	6.41	6.36	5.94	6.74	5.98	6.38	6.14	6.51	6.80	

Table 4-19. Lower Choctawhatchee River - Demand Data (2010)

2010 Demands- Lower Choctawhatchee River														
Withdrawals (MGD)														
Category	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**AVG**	**Percentage**
Agriculture-GW	0.13	0.16	0.21	0.39	0.56	0.84	0.94	0.72	0.54	0.40	0.20	0.14	0.44	48%
Agriculture-SW	0.15	0.18	0.23	0.42	0.59	0.89	1.00	0.77	0.57	0.42	0.22	0.17	0.47	52%
Ag-Total	0.28	0.34	0.44	0.81	1.15	1.73	1.94	1.49	1.11	0.82	0.42	0.31	0.91	100%
Total-SW	**0.16**	**0.18**	**0.24**	**0.43**	**0.60**	**0.90**	**1.00**	**0.77**	**0.58**	**0.43**	**0.23**	**0.17**	**0.47**	**28%**
Total-GW	**0.87**	**0.81**	**0.89**	**1.13**	**1.37**	**1.75**	**1.81**	**1.55**	**1.40**	**1.12**	**0.92**	**0.86**	**1.21**	**72%**
Total	**1.03**	**0.99**	**1.13**	**1.56**	**1.97**	**2.65**	**2.81**	**2.32**	**1.98**	**1.55**	**1.15**	**1.03**	**1.68**	**100%**
Ag GW %	**15%**	**20%**	**24%**	**35%**	**41%**	**48%**	**52%**	**46%**	**39%**	**36%**	**22%**	**16%**		
Ag SW %	**94%**	**100%**	**96%**	**98%**	**98%**	**99%**	**100%**	**100%**	**98%**	**98%**	**96%**	**100%**		
Returns (MGD)														
Category	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**AVG**	
Agriculture	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Total Returns	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

Regarding agricultural production, surface water accounts for 52 percent of all agricultural withdrawals in the Lower Choctawhatchee, 65 percent in the Pea, and 75 percent in the Upper Choctawhatchee. This represents 100 percent of all surface water withdrawals in the Lower Choctawhatchee, 99 percent in the Pea, and 99 percent in the Upper Choctawhatchee (Harper et al., 2015).

Stream order is also important to the overall hydrological makeup of the basin, and thus examining the stream network is important in determining potential project sites. Stream order is a description of the position in the basin that relates to the relative size of streams. The smallest tributaries are referred to as first-order streams, while the largest river in the world is a twelfth-order waterway (Strahler, 1952). First-order streams are perennial streams that have no permanently flowing tributaries. First- through third-order streams are called headwater streams. Streams classified as fourth- through sixth order are considered medium streams. A stream that is seventh-order or larger constitutes a river. Furthermore, stream order is also an important part of the River Continuum Concept, widely used to determine the biotic community expected in a stream based on the size of the stream itself (Vannote et al., 1980). As water travels from headwater streams toward the mouths of rivers, the width, depth, and velocity of the waterways gradually increase, as well as the amount of water discharged. These changes in a stream's physical characteristics dictate the types of aquatic organisms that can inhabit a stream. Based on the second version of the National Hydrography Dataset Plus (NHDplusV2), the national geospatial surface water framework, the surface water reaches within the basin are shown within Figure 4-21.

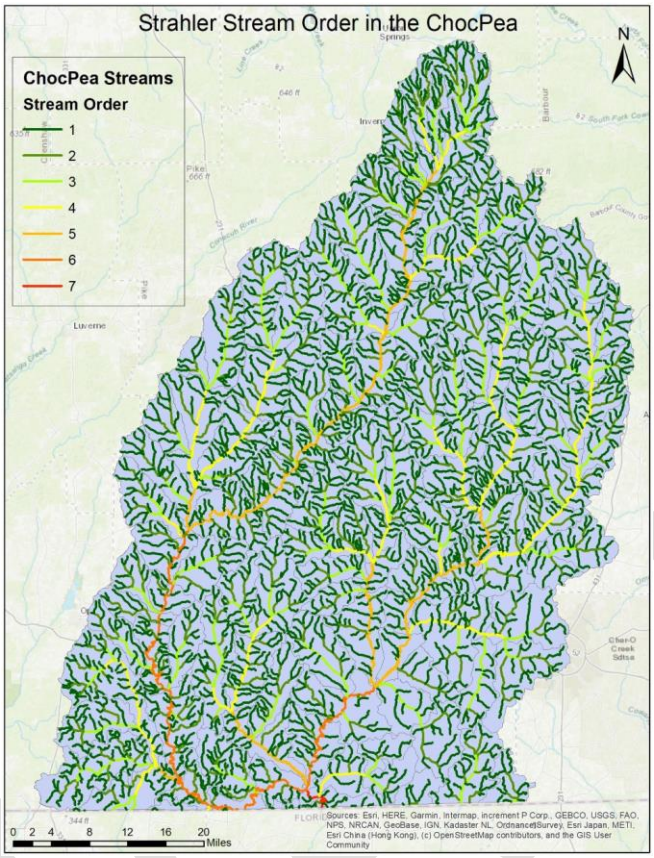

Figure 4-21: Stream Order Map for Choc-Pea Basin

4.9.2 Water Quality

4.9.2.1 Impaired Streams and TMDLs

Section 303(d) of the Clean Water Act requires the EPA and the States to identify and develop plans to restore impaired waters (Total Maximum Daily Loads, TMDL). Review of the 2018 303(d) list of impaired waters in Alabama reveals 30 of the 111 HUC-12 sub-watersheds with the Choc-Pea Basin contain a total of 36 303(d)-listed streams. Only one of these streams, located in one HUC-12, lists agriculture as an impairment source: the Dowling Branch of Cox Mill-Hurricane Creek.

The ADEM lists 38 approved TMDLs for 28 stream reaches within the Choc-Pea Basin. Of these 38 approved TMDLs, there are three areas with organic enrichment/dissolved oxygen-focused TMDLs, one area with a nutrient-focused TMDL, two areas with siltation-focused TMDLs, six areas with metal-focused TMDLs, and 26 areas with pathogen-focused TMDLs. These impairments and their corresponding streams are listed in Table 4-20, below.

Table 4-20. TMDLs in Choc-Pea Basin

Impaired Stream	River Basin	County	Pollutants	Sources
Judy Creek	Choctawhatchee	Barbour Dale	Pathogens (*E. coli*)	Animal feeding operations Pasture grazing
Beaver Creek	Choctawhatchee	Houston	Nutrients	Municipal Urban runoff/storm sewers
Beaver Creek	Choctawhatchee	Houston	Organic Enrichment (BOD)	Municipal Urban runoff/ storm sewers
Panther Creek	Choctawhatchee	Dale Henry	Pathogens (*E. coli*)	Animal feeding operations Pasture grazing
Lindsey Creek	Choctawhatchee	Barbour	Pathogens (*E. coli*)	Animal feeding operations Pasture grazing
Pauls Creek	Choctawhatchee	Barbour	Pathogens (*E. coli*)	Animal feeding operations Pasture grazing
Killebrew Factory Creek	Choctawhatchee	Dale	Pathogens (*E. coli*)	Pasture grazing
Bear Creek	Choctawhatchee	Dale	Pathogens (*E. coli*)	Animal feeding operations Pasture grazing
Claybank Creek	Choctawhatchee	Dale	Pathogens (*E. coli*)	Animal feeding operations Pasture grazing
Pine Log Branch	Choctawhatchee	Geneva	Pathogens (*E. coli*)	Pasture grazing
Pates Creek	Choctawhatchee	Geneva Houston	Pathogens (*E. coli*)	Animal feeding operations Pasture grazing
Hurricane Creek	Choctawhatchee	Geneva	Pathogens (*E. coli*)	Animal feeding operations Collection system failure Pasture grazing
Dowling Branch	Choctawhatchee	Geneva	Organic Enrichment (BOD)	Agriculture Municipal Urban runoff/storm sewers
Harrand Creek	Choctawhatchee	Coffee Dale	Siltation	Urban runoff/storm sewers

Table 4-20. TMDLs in Choc-Pea Basin

Impaired Stream	River Basin	County	Pollutants	Sources
Indian Camp Creek	Choctawhatchee	Coffee	Siltation	Land development Urban runoff/ storm sewers
Brackin Mill Creek	Choctawhatchee	Coffee Dale	Pathogens (*E. coli*)	Pasture grazing
Choctawhatchee River	Choctawhatchee	Dale Geneva Houston	Pathogens (*E. coli*)	Animal feeding operations Collection system failures Pasture grazing
Choctawhatchee River	Choctawhatchee	Dale Geneva Houston	Metals (Mercury)	Atmospheric deposition
Choctawhatchee River	Choctawhatchee	Dale Houston	Metals (Mercury)	Atmospheric deposition
West Fork Choctawhatchee River	Choctawhatchee	Dale	Pathogens (*E. coli*)	Animal feeding operations Pasture grazing
West Fork Choctawhatchee River	Choctawhatchee	Dale	Pathogens (*E. coli*)	Animal feeding operations Pasture grazing
West Fork Choctawhatchee River	Choctawhatchee	Barbour Dale	Pathogens (*E. coli*)	Animal feeding operations Pasture grazing
Big Creek	Choctawhatchee	Dale	Pathogens (*E. coli*)	Animal feeding operations Pasture grazing
Blanket Creek	Choctawhatchee	Coffee	Organic Enrichment (BOD)	Municipal
Pea River	Choctawhatchee	Geneva	Metals (Mercury)	Atmospheric deposition
Pea River	Choctawhatchee	Coffee	Metals (Mercury)	Atmospheric deposition
Pea River	Choctawhatchee	Coffee	Metals (Mercury)	Atmospheric deposition
Spring Creek	Choctawhatchee	Bullock	Pathogens (*E. coli*)	Pasture grazing

Table 4-20. TMDLs in Choc-Pea Basin

Impaired Stream	River Basin	County	Pollutants	Sources
Big Sandy Creek	Choctawhatchee	Bullock	Pathogens (*E. coli*)	Animal feeding operations Pasture grazing
Pea River	Choctawhatchee	Coffee Dale	Pathogens (*E. coli*)	Animal feeding operations Pasture grazing
Halls Creek	Choctawhatchee	Coffee	Pathogens (*E. coli*)	Animal feeding operations Pasture grazing
Buckhorn Creek	Choctawhatchee	Pike	Pathogens (*E. coli*)	Animal feeding operations Pasture grazing
Huckleberry Creek	Choctawhatchee	Coffee Dale	Pathogens (*E. coli*)	Pasture grazing
Patrick Creek	Choctawhatchee	Coffee	Pathogens (*E. coli*)	Pasture Grazing
Pea River	Choctawhatchee	Geneva	Pathogens (*E. coli*)	Animal feeding operations Collection system failure Pasture grazing
Flat Creek	Choctawhatchee	Coffee Covington Geneva	Pathogens (*E. coli*)	Animal feeding operations Pasture grazing
Choctawhatchee River	Choctawhatchee	Geneva	Metals (Mercury)	Atmospheric deposition
Wrights Creek	Choctawhatchee	Geneva	Pathogens (*E. coli*)	Animal feeding operations Pasture grazing

The 303(d) listed impaired streams and TMDLs within the project area have been mapped and can be seen in Figures 4-22 and 4-23, respectively.

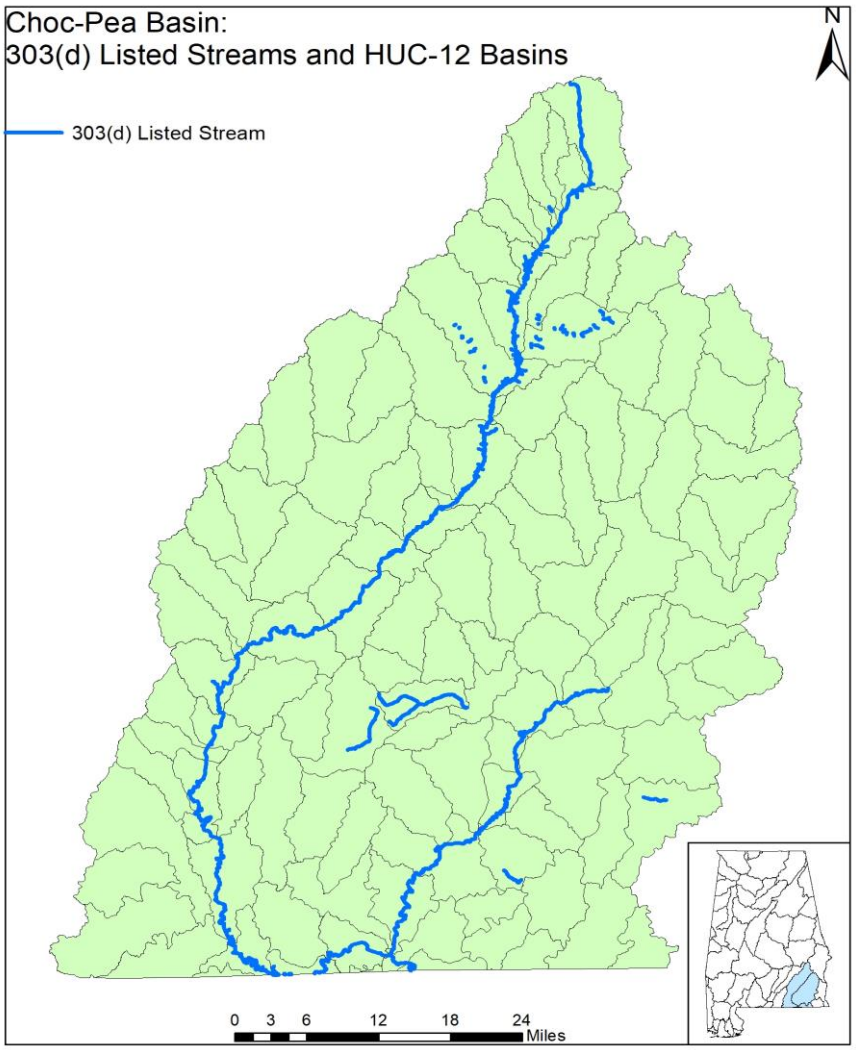

Figure 4-22: Map of 303(d) Listed Streams Within Choc-Pea Basin

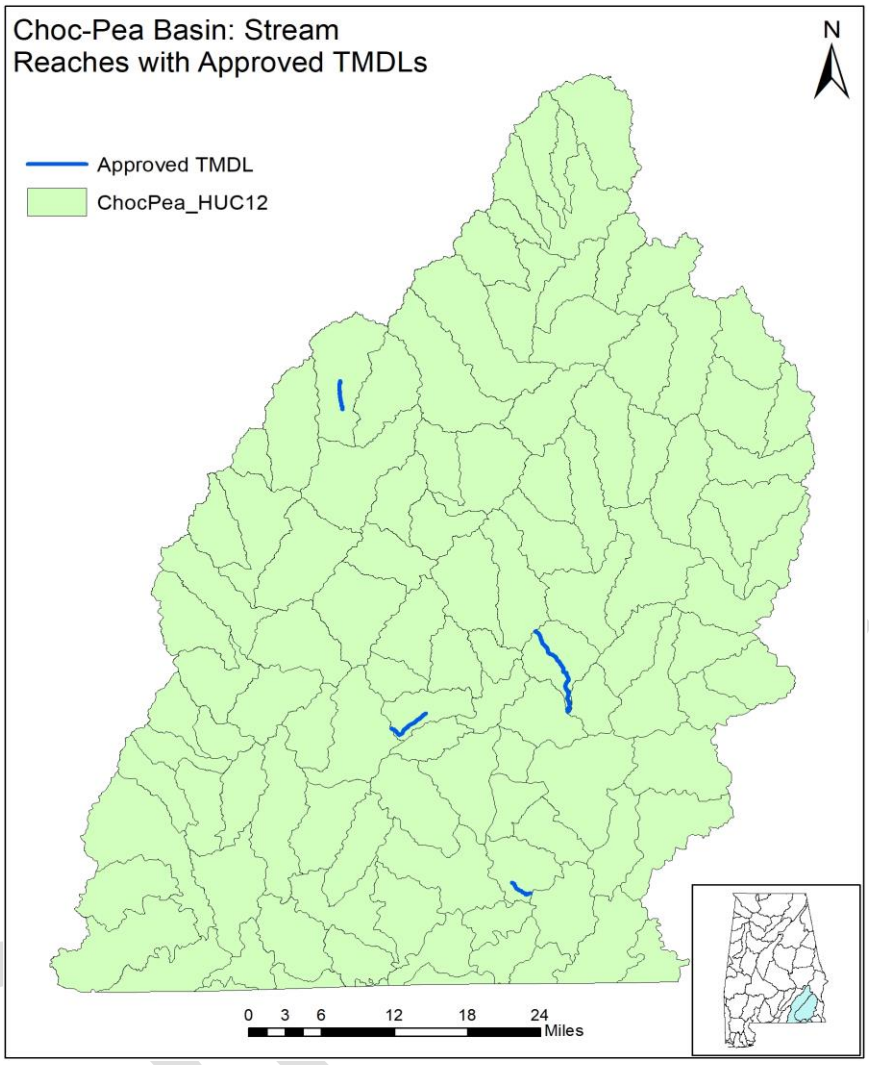

Figure 4-23: Map of Approved TMDLs Within Choc-Pea Basin

4.9.2.2 Total Nitrogen

The main parameter considered during water quality evaluations was Total Nitrogen (TN) due to its correlation with agriculture, the purpose of this project. TN is measured as the sum of organic and inorganic nitrogen, which includes nitrate (NO_3), nitrite (NO_2), and ammonia (NH_3). Nitrogen levels are also used as an indicator of nutrient content for streams in the southeast, as high nutrient levels may result in eutrophication and harmful algal blooms that impair water quality.

Though the EPA does not have a regulation for TN loads (nor has the state of Alabama established a standard), EPA guidelines note an acceptable range of two to six mg/L in water bodies (EPA, 2013). Additionally, the maximum contaminant level goal (MCLG) for nitrate-nitrite is 10mg/L (EPA,

2008). A modified USGS SPARROW nitrogen model predicted TN concentrations for 119 reaches within the study area. Of these existing reaches, 7 reaches (4 percent overall) had TN concentrations above 6-mg/L. Hurricane Creek and Barnes Creek have the highest TN baseline conditions at about 11 mg/L. Additional reach basin size, mean flow, and TN baseline estimates are depicted in Appendix D, Table D-21.

4.9.2.3 Temperature, Dissolved Oxygen, pH, Total Suspended Solids, Total Dissolved Solids, and Turbidity

Additional water quality constituents used to characterize existing conditions in the Choctawhatchee River and Pea River watersheds are water temperature, dissolved oxygen (DO), pH, total suspended solids (TSS), total dissolved solids (TDS) and turbidity. The Choctawhatchee, Pea, and Yellow Rivers Watershed Management Plan (CPYRWMP) provides data on the Yellow River, Pea River (3 locations), and the Choctawhatchee River (3 locations) for these constituents.

For these locations, stream water temperature ranged from 15.5 to 20 degrees Celsius (C) with an average water temperature of 16.6 (C).

DO ranged from 8.3 mg/L to 9-mg/L with an average level of 8.8-mg/L, all of which exceeds the 5-mg/L threshold associated with degraded benefits on the aquatic environment (CPYRWMA, n.d.).

Acidity of pH ranged from 5.9 to 6.6 with an average concentration of 6.5. The Pea River location below the secondary drinking water standard of 6.5 to 8.5 was at the Alabama 10 crossing in Pike County, indicating potentially harmful levels of acidity at this location (CPYRWMA, n.d.).

TSS ranged from 13-29 mg/L and TDS at 44-mg/L at the Yellow River (only site measured). These values are within the EPA standard of 500-mg/L for TDS and TSS guideline of 58 mg/L (Minnesota Pollution Control Agency, 2008) needed for clear water and healthy aquatic environments.

Regarding water clarity, turbidity ranged from 11 NTU to 66 NTU and 4 of the 7 sites monitored (Pea River at US 84 crossing, Coffee County and AL 27 crossing , Geneva County, East Fork Choctawhatchee, and Choctawhatchee River) exceeded the guideline of 25 NTU for healthy fisheries and recreational waters (Minnesota Pollution Control Agency, 2008).

4.10 Wetlands and Riparian Areas

Wetland communities are high in biodiversity and provide essential habitat for many species. Common wetland species include ducks, geese, herons, egrets, shore birds, songbirds, birds of prey, raccoons, rabbits, beavers, muskrats, white-tailed deer, reptiles, and amphibians. The study area contains 92,523 acres of wetlands, approximately 4.7 percent of the total land cover in the project area. This acreage includes many natural areas including Pike County Pocosin Complex and Blue Springs State Park. Approximately 52,121 acres of mapped agricultural land within the project area is within a 0.5-kilometer (km) distance of a riparian area. This equates to less than 11 percent of the

total agricultural land in the basin area. Currently, less than one percent of the basin's irrigated agricultural acreage is within 0.5-km of a riparian area. The locations of wetlands and their types, herbaceous or woody, are depicted in Figure 4-24.

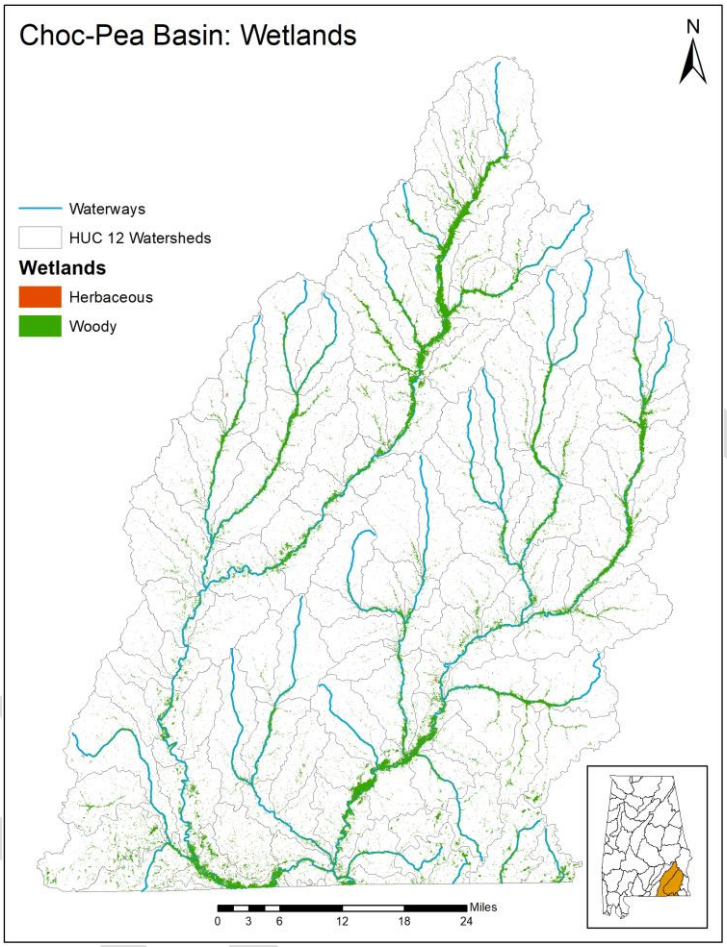

Figure 4-24: Wetlands in the Choc-Pea Basin

4.11 Wildlife Resources

4.11.1 General Wildlife

Wildlife distribution and populations depend largely on the quantity and quality of available habitat. Habitat conditions are in turn influenced by land use, land management, distribution of water, climate, human influences, and other limiting factors. While agricultural crop land does not seem like ideal habitat for wildlife, many habitat generalists or edge species are able to successfully utilize these areas. Table 4-21 lists wildlife species found in the project area that can occur in the vicinity of agricultural crop land.

Table 4-21. Common Wildlife Species that Occur in the Vicinity of Agricultural Crop Land within the Choc-Pea Basin

Species	Scientific Name
Black racer	*Coluber constrictor*
Eastern hognose snake	*Heterodon platirhinos*
Gray rat snake	*Pantherophis spiloides*
Red-tailed hawk	*Buteo jamaicensis*
American crow	*Corvus brachyrhynchos*
Bobcat	*Felis rufus*
Coyote	*Canis latrans*
Red fox	*Vulpes vulpes*
Striped skunk	*Mephitis mephitis*
Raccoon	*Procyon lotor*
Woodchuck	*Marmota monax*
Oldfield deermouse	*Permyscus polionotus*
Eastern harvest mouse	*Reithrodontomys humulis*
Hispid cotton rat	*Sigmodon hispidus*
Southern toad	*Anaxyrus terrestris*
Fowler's toad	*Anaxyrus fowleri*
Eastern mole	*Scalopus aquaticus*
Eastern cottontail	*Sylviagus floridanus*
White-tailed deer	*Odocoileus virginianus*
Opossum	*Didelphis virginiana*
Brown-headed cowbird	*Molothrus ater*
Purple martin	*Progne subis*

Source: ADCNR (2020)

The project area provides diverse and extensive habitat for fish and wildlife. Approximately 49 percent of the Choc-Pea Basin is covered by forested land and includes areas with more species of trees than any other forest in temperate North America (CPYRWMA, n.d.). Furthermore, the Choc-Pea Basin is home to Big Bend Wildlife Sanctuary found in Enterprise, AL, Blue Springs State Park in Clio, Alabama, and Pike County Lake in Troy, Alabama. Big Bend Wildlife Sanctuary is a wildlife rehabilitation center serving the South-Eastern region of the State. Blue Springs State Park totals 103-acres which includes a birding trail and wooded habitat along the West Fork Choctawhatchee River. Pike County Lake is a publicly accessed lake upstream from Big Creek and is surrounded by wooded land suitable for wildlife habitat year-round.

The United States Fish and Wildlife Service, Alabama Department of Conservation and Natural Resources and Geological Survey of Alabama have selected strategic habitat units (SHUs) and strategic river reach units (SRRUs) to focus activities for the management, recovery, and restoration of populations of rare fishes, mussels, snails, and crayfishes. The SHUs and SRRUs contain a substantial part of the area's remaining high-quality water courses and reflect the variety of aquatic habitats occupied by these species - both historically and presently (USGS, n.d. -a).

Figure 4-25 shows the SHUs within the Choc-Pea Basin.

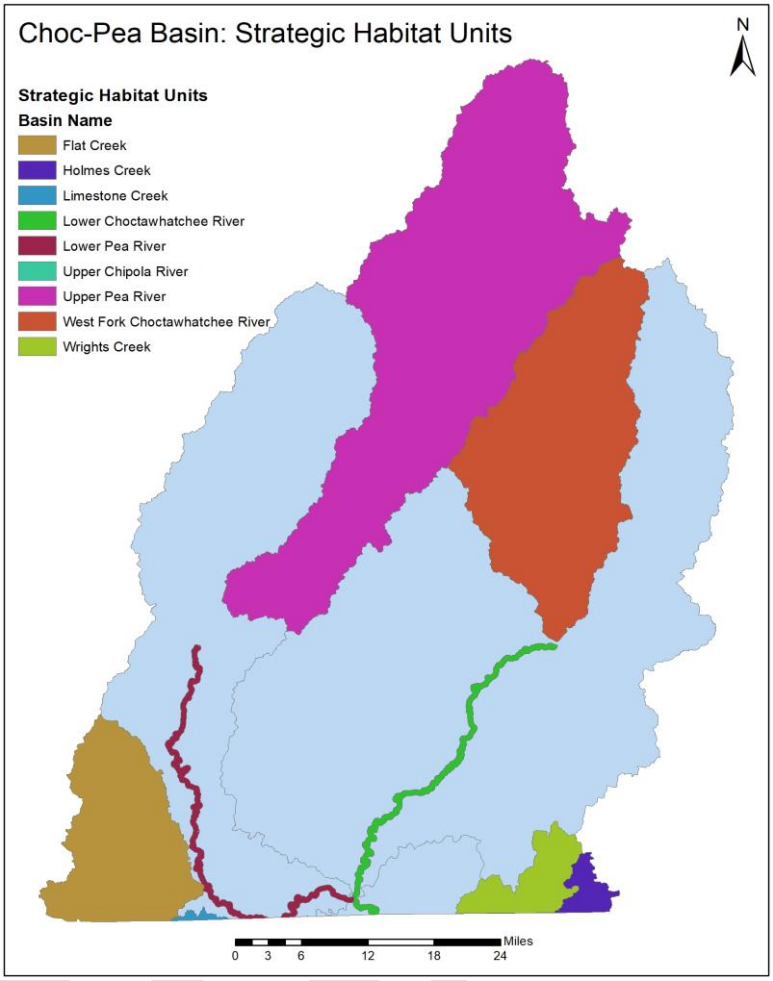

Figure 4-25: Strategic Habitat Units

4.11.2 MBTA/BGEPA Species

The U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) project planning tool powered by the Environmental Conservation Online System (ECOS) was used to identify bird species of particular concern that are protected under the Migratory Bird Treaty Act (MBTA) or the Bald and Golden Eagle Protection Act (BGEPA) and potentially occur within the Choc-Pea Basin. The bird species listed in Table 4-22 may occur in the project area and are Birds of Conservation Concern (BCC) species or an eagle. This is not a complete list of MBTA species that may occur in the area.

Table 4-22. List of MBTA and BGEPA Species Potentially Occurring within the Choc-Pea Basin

MBTA/BGEPA Species	Scientific Name
American kestrel	*Falco sparverius paulus*
Bachman's sparrow	*Aimophila aestivalis*
Bald eagle	*Haliaeetus leucocephalus*
Common ground-dove	*Columbina passerina exigua*
Dunlin	*Calidris alpina arcticola*
Eastern whip-poor-will	*Antrostomus vociferus*
Kentucky warbler	*Oporornis formosus*
King rail	*Rallus elegans*
Lesser yellowlegs	*Tringa flavipes*
Prairie warbler	*Denroica discolor*
Prothonotary warbler	*Protonotaria citrea*
Red-headed woodpecker	*Melanerpes erythrocephalus*
Rusty blackbird	*Euphagus carolinus*
Semipalmated sandpiper	*Calidris pusilla*
Short-billed dowitcher	*Limnodromus griseus*
Swallow-tailed kite	*Elanoides forficatus*
Wood thrush	*Hylocichla mustelina*

Source: USFWS (2020)

4.11.3 Federally Listed Species

USFWS IPaC (USFWS 2020) identified 20 federally listed species that potentially occur within the Choc-Pea Basin, including two species of birds, two reptiles, one fish, eleven clams, and four flowering plants (Table 4-23). Additionally, the project area overlaps critical habitat for six species.

Table 4-23. List of Federally Listed Species Potentially Occurring Within the Choc-Pea Basin

Group	Species	Scientific Name	Listed Status
Birds	Wood stork	*Mycteria americana*	Threatened
	Red-cockaded woodpecker	*Picoides borealis*	Endangered
Reptiles	Eastern indigo snake	*Drymarchon corais couperi*	Threatened
	Gopher tortoise	*Gopherus polyphemus*	Candidate
Fishes	Gulf sturgeon[1]	*Acipenser oxyrinchus desotoi*	Threatened
Clams	Chipola slabshell	*Elliptio chipolaensis*	Threatened
	Choctaw bean[1]	*Villosa choctawensis*	Endangered
	Fuzzy pigtoe[1]	*Pleurobema strodeanum*	Threatened
	Gulf moccasinshell	*Medionidus penicillatus*	Endangered
	Narrow pigtoe	*Fusconaia escambia*	Threatened
	Oval pigtoe	*Pleurobema pyriforme*	Endangered
	Round ebonyshell	*Fusconaia rotulata*	Endangered
	Shinyrayed pocketbook	*Lampsilis subangulata*	Endangered
	Southern kidneyshell[1]	*Ptychobranchus jonesi*	Endangered
	Southern sandshell[1]	*Hamiota australis*	Threatened
	Tapered pigtoe[1]	*Fusconaia burkei*	Threatened
Flowering Plants	American chaffseed	*Schwalbea americana*	Endangered
	Gentian pinkroot	*Spigelia gentianoides*	Endangered
	Pondberry	*Lindera melissifolia*	Endangered
	Relict trillium	*Trillium reliquum*	Endangered

[1] Critical habitat for this species overlaps the project area.

4.11.4 State-Listed Species

In addition to federally listed species, the project area may provide habitat to species of concern listed at the State level. Table 4-24 lists species that occur in the Choc-Pea Basin that are designated

State Rank S1 (Critically Imperiled) or S2 (Imperiled).

Table 4-24. State-Listed Species Potentially Occurring in the Choc-Pea Basin that are Considered Critically Imperiled or Imperiled

Group	Species	Scientific Name	State Rank
Birds	King rail	*Picoides borealis*	Imperiled/vulnerable[1]
	Least bittern	*Ixobrychus exilis*	Imperiled[2]
	Purple gallinule	*Porphyrio martinicus*	Imperiled[1]
	Red-cockaded woodpecker	*Picoides borealis*	Imperiled
	Swallow-tailed kite	*Elanoides forficatus*	Imperiled
	White ibis	*Eudocimus albus*	Imperiled[1]
	Wood stork	*Mycteria americana*	Imperiled[2]
Amphibians	Gopher frog	*Lithobates capito*	Imperiled
	Pine barrens tree frog	*Hyla andersonii*	Imperiled
	Southern dusky salamander	*Desmognathus auriculatus*	Imperiled
Reptiles	Barbour's map turtle	*Graptemys barbouri*	Imperiled
	Black swamp snake	*Seminatrix pygaea*	Critically imperiled
	Eastern indigo snake	*Drymarchon couperi*	Critically imperiled
	Florida pine snake	*Pituophis melanoleucus mugitus*	Imperiled
	Florida softshell turtle	*Apalone ferox*	Imperiled
	Mimic glass lizard	*Ophisaurus mimicus*	Critically imperiled
Fishes	Alabama shad	*Alosa alabamae*	Imperiled
	Bluenose shiner	*Pteronotropis welaka*	Imperiled
	Gulf sturgeon	*Acipenser oxyrinchus desotoi*	Critically imperiled
	Southern logperch	*Percina austroperca*	Imperiled
Clams	Chipola slabshell	*Elliptio chipolaensis*	Critically imperiled

Table 4-24. State-Listed Species Potentially Occurring in the Choc-Pea Basin that are Considered Critically Imperiled or Imperiled

Group	Species	Scientific Name	State Rank
	Choctaw bean	*Villosa choctawensis*	Imperiled
	Delicate spike	*Elliptio arctata*	Imperiled
	Flatwoods creekshell	*Strophitus williamsi*	Imperiled
	Florida sandshell	*Lampsilis floridensis*	Imperiled
	Fluted elephantear	*Elliptio mcmichaeli*	Imperiled
	Fuzzy pigtoe	*Pleurobema strodeanum*	Imperiled
	Gulf lilliput	*Toxoloasma* sp. 1	Imperiled
	Gulf moccasinshell	*Medionidus penicillatus*	Critically imperiled
	Narrow pigtoe	*Fusconaia escambia*	Imperiled
	Oval pigtoe	*Pleurobema pyriforme*	Critically imperiled
	Round ebonyshell	*Fusconaia rotulata*	Critically imperiled
	Shinyrayed pocketbook	*Lampsilis subangulata*	Critically imperiled
	Southern kidneyshell	*Ptychobranchus jonesi*	Critically imperiled
	Southern sandshell	*Hamiota australis*	Imperiled
	Tapered pigtoe	*Fusconaia burkei*	Imperiled
Mammals	Eastern spotted skunk	*Spilogale putorius*	Imperiled/vulnerable
	Southeastern myotis bat	*Myotis austroriparius*	Imperiled

Sources: Silvano et al. (2007) and Alabama Natural Heritage Program (2019)
[1] Rank applies to breeding population
[2] Rank applies to non-breeding population

4.12 Environmental Justice

Environmental Justice (EJ) is defined by USDA NRCS "as the fair treatment and meaningful involvement of all people regardless of race, color, national origin or income regarding the development, implementation and enforcement of environmental laws, regulations and policies." Environmental Justice Executive Order 12898, Federal Actions to Address EJ in Minority Populations, and Low-Income Populations, requires that "each federal agency shall make achieving EJ part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations" (CEQ, 1997). Environmental Justice is achieved when all citizens enjoy the same degree of protections and equal access to NRCS programs and services to achieve a healthy environment in which to live, learn and work." Taking into consideration the EJ risks within the basin will enable better project planning to ensure the rights and safety of all populations.

The counties in the basin area have an average of 22.41 percent of the population below poverty level (U.S Census Bureau, 2018) and approximately 29.60 percent of the basin's farm operators are from minority populations (USDA/NASS QuickStats, 2017).

To better understand the EJ concerns within the watershed boundaries, the EPA's Environmental Justice Screening and Mapping Tool (EJSCREEN Version 2018) can be used as a heuristic for analyzing concerns. EJSCREEN is a free online tool that provides environmental justices indexes by county, as compared to the rest of the country. EJSCREEN does not provide data on every environmental impact and demographic indicator that may be relevant to a particular location, and data may be several years old. However, the tool is useful for providing an overarching view of potential EJ concerns.

The EJSCREEN identifies eleven EJ Indices that reflect the eleven environmental indicators that can be used for a broad assessment of potential EJ concerns within the watershed region. The eleven environmental indicators are based on information developed from direct measurements, proxy estimates of pollution exposure, and facility location information. Environmental and proximity indicators are screening-level proxies for exposure or risk, not representative of actual exposure or risk.

The eleven EJ Indices:

1. National Scale Air Toxics Assessment Air Toxics Cancer Risk
2. National Scale Air Toxics Assessment Respiratory Hazard Index
3. National Scale Air Toxics Assessment Diesel PM (DPM)
4. Particulate Matter (PM2.5)
5. Ozone
6. Lead Paint Indicator
7. Traffic Proximity and Volume

8. Proximity to Risk Management Plan Sites
9. Proximity to Treatment Storage and Disposal Facilities
10. Proximity to National Priorities List Sites
11. Proximity to Major Direct Water Dischargers (EPA, 2018b)

Table 4-25 reports the EJSCREEN values for the following counties in the basin: Geneva County, Dale County, Coffee County, Covington County, Pike County, Henry County, Houston County, Barbour County, and Bullock County.

The national percentile indicates what percent of the United States population has an equal or lower value, meaning *less* potential for exposure/ risk/ proximity to certain facilities, or a lower percent minority. For example, if the results indicate that an area is 48 percent minority and is at the 69th national percentile, this means that 48 percent of the area's population is minority, and that is an equal or higher percent minority than where 69 percent of the US population lives.

Table 4-25. Environmental Justice Index Variables for the Approximate Area of the Choc-Pea Basin

Environmental Justice Index Variable	Description	Value	State Average	Percentile in State	Percentile in USA
Particulate Matter (PM 2.5 in ug/m3)	PM2.5 levels in air, µg/m3 annual avg	9.96	11	7	57
NATA Diesel PM (ug/m3)	Diesel particulate matter (DPM) level in air, µg/m3	0.19	0.62	4	<50th
Ozone (ppb)	Ozone summer seasonal avg. of daily maximum 8-hour concentration in air in parts per billion	37.30	40	7	17
NATA Air Toxics Cancer Risk (risk per MM)	Lifetime cancer risk from inhalation of air toxics	49	51	47	80-90th
NATA Respiratory Hazard Index	Air toxics respiratory hazard index (ratio of exposure concentration to health-based reference concentration)	1.80	2	41	50-60th
Traffic Proximity and Volume (daily traffic count/distance to road)	Count of vehicles (AADT, avg. annual daily traffic) at major roads within 500 meters, divided by distance in meters (not km)	43	170	52	38
Lead Paint Indicator (% pre-1960s housing)	Percent of housing units built pre-1960, as an indicator of potential lead paint exposure	0.25	0.19	77	57

Table 4-25. Environmental Justice Index Variables for the Approximate Area of the Choc-Pea Basin

Environmental Justice Index Variable	Description	Value	State Average	Percentile in State	Percentile in USA
Superfund Proximity (site count/km distance)	Proximity to National Priorities List (NPL) sites within 5 km (or nearest one beyond 5 km), each divided by distance in kilometers	0.02	0.05	26	17
RMP Proximity (facility count/km distance)	Count of RMP (potential chemical accident management plan) facilities within 5 km (or nearest one beyond 5 km), each divided by distance in kilometers	0.17	39	53	36
Hazardous Waste Proximity (facility count/km distance)	Count of hazardous waste facilities (TSDFs and LQGs) within 5 km (or nearest beyond 5 km), each divided by distance in kilometers	0.08	0.40	33	21
Wastewater Discharge Indicators (toxicity-weighted concentration/m distance)	RSEI modeled Toxic Concentrations at stream segments within 500 meters, divided by distance in kilometers	0.0062	0.25	73	78
Demographic Index	This is essentially the average of the count of minorities and count of low-income individuals	30	37	48	50
Minority Population	Minorities usually consist of four major racial and ethnic groups that often make up a substantial portion of, not the majority in each population: African Americans, American Indians and Alaska Natives, Asians and Pacific Islanders, and Hispanics	12	34	27	27
Low Income Population	Families earning less than twice the federal poverty rate	48	39	66	74
Linguistically Isolated Population	A linguistically isolated household is one in which no member 14 years old and over (1) speaks only English or (2) speaks a non-English language and speaks English “very well.” In other words, all members 14 years old and over have at least some difficulty with English	0	1	72	44
Population with Less Than High School Education	Percent of population that has not completed a high school education	22	15	75	80

Table 4-25. Environmental Justice Index Variables for the Approximate Area of the Choc-Pea Basin

Environmental Justice Index Variable	Description	Value	State Average	Percentile in State	Percentile in USA
Population under Age 5	Self-explanatory	4	6	28	26
Population over Age 64	Self-explanatory	19	15	74	76

**Data includes Geneva County, Dale County, Coffee County, Covington County, Pike County, Henry County, Houston County, Barbour County, and Bullock County, EPA Region 4 (2014 Population: 356,613)

The demographic portions of the EJ Index can be thought of as the additional number of susceptible individuals in the block group, beyond what you would expect for a block group with this size total population. This is essentially the average of the count of minorities and count of low-income individuals (EPA, 2018b). The primary indicators of EJ concern include: Wastewater Discharge Indicators (toxicity-weighted concentration/m distance) (78th percentile in USA), and NATA Air Toxics Cancer Risk (risk per MM) (80-90th^{h} percentile in the USA), and NATA Respiratory Hazard Index (50-60th percentile in the USA).

The wastewater discharge indicator index is depicted below in Figure 4-26 in relation to the project area.

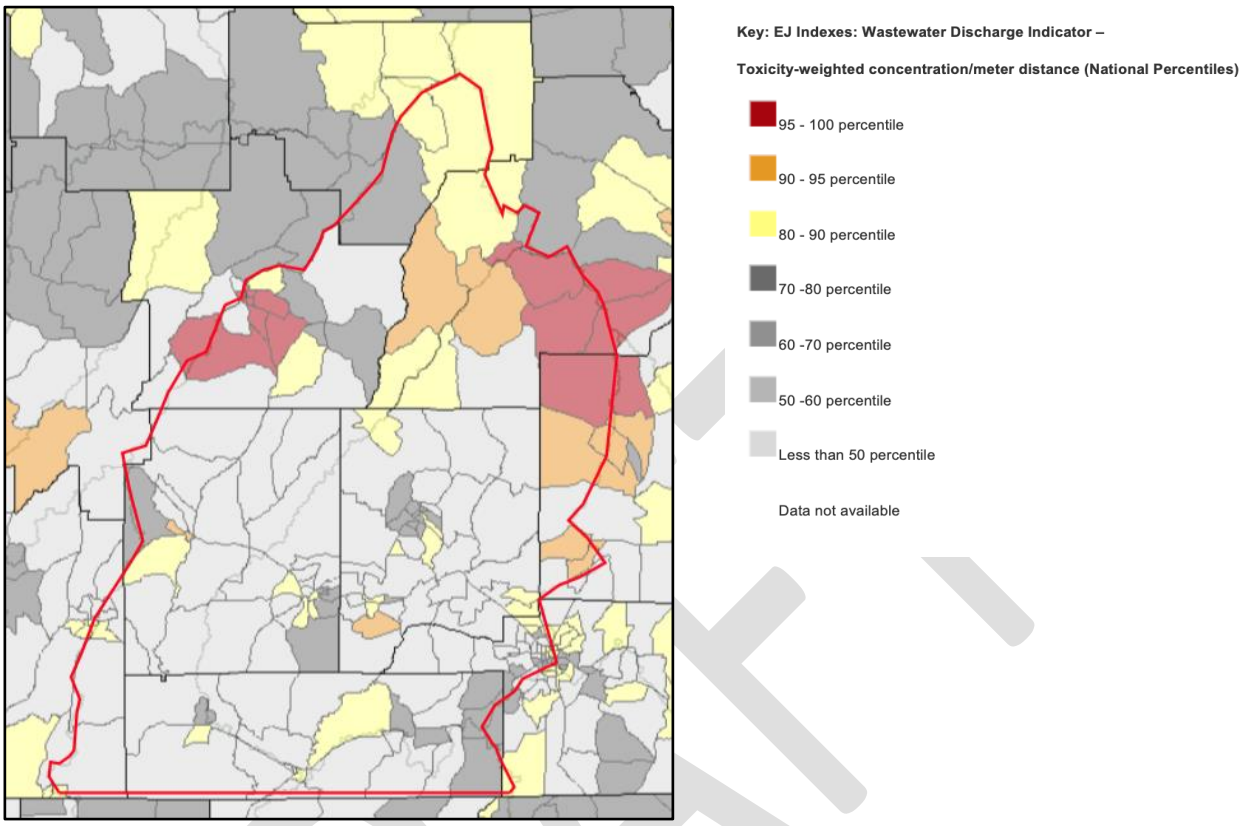

Figure 4-26: Wastewater Discharge Indicator Index by County in Basin Area from EJSCREEN Data

The region also has a significant number of older (76th percentile), low income residents (74th percentile) and residents with less than a high school education (80th percentile) compared to the national average. Restricted mobility or job opportunity could play a role in future environmental justice concerns around these indices.

4.12.1 National Scale Air Toxics Assessment

Air toxins are airborne substances that if not addressed can cause or may cause serious health problems including cancer, reproductive problems or birth defects. Air toxics can also cause harmful environmental and ecological effects. Examples of air toxics include benzene, found in gasoline; tetrachloroethylene, emitted from some dry-cleaning facilities; and methylene chloride, used as a solvent and paint stripper by several industries. The EPA has classified many of these pollutants as "carcinogenic to humans," "likely to be carcinogenic to humans," or "suggestive evidence of carcinogenic potential." Air toxics are also associated with many noncancerous adverse health effects. These include effects on the lungs and other parts of the respiratory system; on the immune, nervous and reproductive systems; and to organs such as the heart, liver and kidneys. While

EJSCREEN reported the NATA Air Toxics Cancer Risk (risk per MM) (70-80th percentile in the USA), and NATA Respiratory Hazard Index (60-70th percentile in the USA) to be relatively high when compared to the national average, Table 4-26 reports the average air toxicity cancer risk for each county (EPA, 2018a).

When NATA shows a potential cancer risk of greater than 100 in 1 million at a census tract, it means there may be an elevated cancer risk in that tract. A risk level of 100 in 1 million refers to the likelihood that 100 in 1 million (1 in 10,000) people would develop cancer if they breathe air containing the same amount of the same air toxic for 70 years. This risk would be in addition to the cancer risk a person would have without being exposed to the air toxic. Below are listed the average total cancer risk of the counties within the basin boundaries, none of which exceed a risk of 50 in 1 million.

Table 4-26. National Air Toxics Assessment Risk Report by County

County	Total Risk Average
Barbour	45.75
Bullock	48.47
Coffee	41.99
Covington	41.72
Dale	42.84
Geneva	40.75
Houston	42.49
Pike	45.17

There have been EJ concerns in Alabama related to the placement of landfill sites in disproportionately disadvantaged towns (Milman, 2019). The two permitted landfills within the basin are located in Houston and Pike Counties and characteristics of each are listed in Tables 4-27a and 4-27b.

Table 4-27a. Landfill Locations within the Choc-Pea Basin

Landfill Name	City	County	Latitude	Longitude	Ownership Type
Coffee County Sanitary Landfill	Elba	Coffee	31.507053	-86.000975	Public
Brundidge Landfill	Brundidge	Pike	31.7041	-85.8299	Private

Table 4-27b. Landfill Locations within the Choc-Pea Basin

Landfill Name	Owner Organization(s)	Closure Year	Current Status	Waste in Place (tons)	Waste in Place Year
Coffee County Sanitary Landfill	Coffee County Commission, AL	2048	Open	3,548,891	2017
Brundidge Landfill	Transload America Inc.	2397	Open		

Landfills are one of the most popular waste disposal methods in the U.S. However, waste landfill sites have the potential to be a major source of land, air, ground and surface water pollution, and can significantly impact residents near landfill sites. Gas released from a waste landfill site can produce hazardous effects on health through volatile organic compounds (VOC). Self-reported health problems like irritations of skin, nose and eyes, allergies, psychological disorders, headache, fatigue, and gastrointestinal problems have been documented and attributed to landfills (Logue & Fox, 1986; Ozonoff et al., 1987). Although a substantial number of studies have been conducted, risks to health from landfill sites are hard to quantify. Increases in risk of adverse health effects (low birth weight, birth defects, certain types of cancers) have been reported near individual landfill sites and in some multisite studies, and although biases and confounding factors cannot be excluded as explanations for these findings, they may indicate real risks associated with residence near certain landfill sites (Vrijheid, 2000). At this point, there is no known reason to associate these landfills with any known health hazard in the basin area. There are currently no federal brownfield sites within the basin area.

4.12.2 Average Farmer Net Income by Operation per County

According to the United States Department of Agriculture National Agricultural Statistics Service, the net income of cash farm operations by county, as measured in dollars, was listed as follows in Table 4-28 (USDA NASS, 2017).

Table 4-28. USDA NASS Net Income of Farms by Operation in Dollars (2017)

County	Net Income
Barbour	$63,011
Bullock	$71,850
Coffee	$70,554
Covington	$42,013
Dale	$124,565
Geneva	$54,022
Henry	$96,137
Houston	$18,894
Pike	$63,217

4.13 Natural Areas

The natural areas in the Choc-Pea Basin are majorly concentrated in the central part of the project basin. All the natural areas in the Choc-Pea total to 83,820 acres. Natural areas can also be further divided into two sections: public areas and federally owned regions. The federally owned regions in the basin total to 63,100 acres, while the public areas total to 20,720 acres. The natural areas within the Choc-Pea Basin area include, but are not limited to, the 11 natural areas listed in Table 4-29.

Table 4-29. List of Natural Areas Within Choc-Pea Basin

Name	Area	Location
Lakes		
Dale County Public Fishing Lake (Ed Linsenby Lake)	92-acre lake	Ozark, AL within Dale County
Geneva County Public Fishing Lake	Two lakes that total 65 acres	Coffee Springs, AL within Geneva County
Coffee County Public Fishing Lake	80-acre lake	Elba, AL within Coffee County
Pike County Public Fishing Lake	45-acre lake	Troy, AL within Pike County
Trails		
Dothan Trail Park	319 acres with a 10-mile trail system	Dothan, AL within Houston County
Pike County Pocosin	Two acquisitions totaling 333 acres	Near Troy, AL within Pike County
Wildlife Management Area		
Geneva State Forest Wildlife Management Area	16,093 acres	Near Florala, AL within Geneva County
State Parks		
Blue Springs State Park	103 acres with a natural spring	Blue Springs, AL within Barbour County
Florala State Park	40-acre park that stretches along 500-acre Lake Jackson;	Florala, AL within Covington County
Federally Owned Properties		
Fort Rucker	63,100 acres	Fort Rucker, AL within Dale, Houston, Geneva, and Coffee Counties

Figure 4-27 depicts the locations of the natural areas within the Choc-Pea Basin as they correspond to public or federally owned locations.

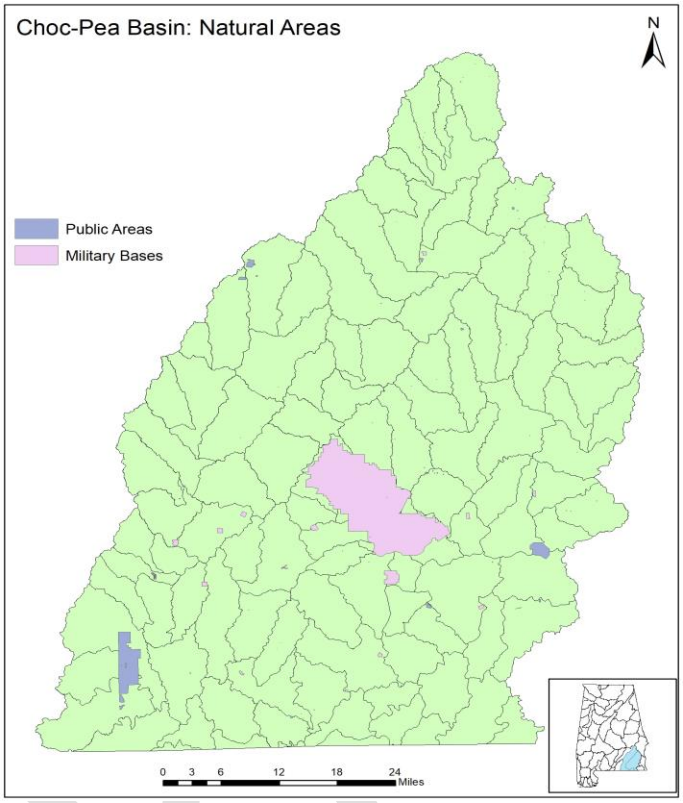

Figure 4-27: Map of Natural Areas Within the Choc-Pea Basin

4.14 Floodplains

Many floodplains exist within the Choc-Pea basin area due to the topography and number of river miles occurring in the basin. For the purpose of public safety and protection of property, many cities and communities within the Choc-Pea Basin participate in the National Flood Insurance Program. The National Flood Insurance Program aims to reduce the impact of flooding on private and public structures. It does so by providing affordable insurance to property owners, renters, and businesses, and by encouraging communities to adopt and enforce floodplain management regulations (FEMA, n.d.). In the Choc-Pea Basin, there are a total of 49 communities that are involved in the National Flood Insurance Program, as depicted in Table 4-30. A list of communities that participate in the National Flood Insurance Program is available at https://www.fema.gov/cis/AL.html.

Table 4-30. Communities that Participate in The National Flood Insurance Program

Community Name	County
Barbour County	
Barbour County*	Barbour County
Town of Blue Springs	Barbour County
Town of Clayton	Barbour County
Town of Clio	Barbour County
City of Eufaula	Barbour County
Town of Louisville	Barbour County
Bullock County	
Bullock County*	Bullock County
Town of Midway	Bullock County
Coffee County	
Coffee County*	Coffee County
City of Elba	Coffee County
City of Enterprise	Coffee County
Town of Kinston	Coffee County
Town of New Brockton	Coffee County
Covington County	
Covington County *	Covington County
City of Florala	Covington County
City of Opp	Covington County
Dale County	
Town of Ariton	Dale County
Town of Clayhatchee	Dale County
Dale County*	Dale County
City of Daleville	Dale County

Table 4-30. Communities that Participate in The National Flood Insurance Program

Community Name	County
City of Dothan	Dale County
City of Enterprise	Dale County
City of Level Plains	Dale County
City of Midland City	Dale County
Town of Newton	Dale County
City of Ozark	Dale County
Town of Pinckard	Dale County
Henry County	
City of Abbeville	Henry County
City of Headland	Henry County
Henry County*	Henry County
Town of Newville	Henry County
Houston County	
City of Dothan	Houston County
Houston County *	Houston County
Town of Taylor	Houston County
Geneva County	
Town of Black	Geneva County
Town of Coffee Springs	Geneva County
Geneva County *	Geneva County
City of Geneva	Geneva County
City of Hartford	Geneva County
Town of Malvern	Geneva County
City of Samson	Geneva County
City of Slocomb	Geneva County

Table 4-30. Communities that Participate in The National Flood Insurance Program

Community Name	County
Pike County	
City of Brundidge	Pike County
Pike County *	Pike County
City of Troy	Pike County

Flood insurance programs use the 1-percent annual exceedance probability (AEP) flood as the basis for the National Flood Insurance Program and to predict flood hazard zones. Considering floods result from many different circumstances, not all floods are equal in magnitude, duration, or effect (USGS, n.d. -b). Placing floods in context allows society to address such issues as the risk to life and property, and to study and understand the environmental benefits of floods (USGS, n.d. -b). Because the 1-percent AEP flood has a 1 in 100 chance of being equaled or exceeded in any 1 year, and it has an average recurrence interval of 100 years, it often is referred to as the "100-year flood" and used to describe a flood of great magnitude.

More recently, people have become more interested in larger floods, such as the "500-year flood," as tolerance for risk is reduced and increased protection from flooding is desired (USGS, n.d. -b). The "500-year flood" corresponds to an AEP of 0.2-percent, which means a flood of that size or greater has a 0.2-percent chance (or 1 in 500 chance) of occurring each year.

The accuracy of estimating the AEP of both the 100-year flood and 500-year flood varies depending on the amount of data available, the accuracy of the data, land-use changes in the river drainage area, climate cycles, and how well the data fits the statistical probability distribution (USGS, n.d. -b).

The USGS stream gage and flood frequency data was assessed for the Choc-Pea. All the annual peak streamflow values that occurred at a stream gage with time were used to estimate the AEP for various flood magnitudes. The flood hazard zones depicted in Figure 4-28 illustrate the areas of potential concern in the event of a 100-year and 500-year flood within the Choc-Pea Basin.

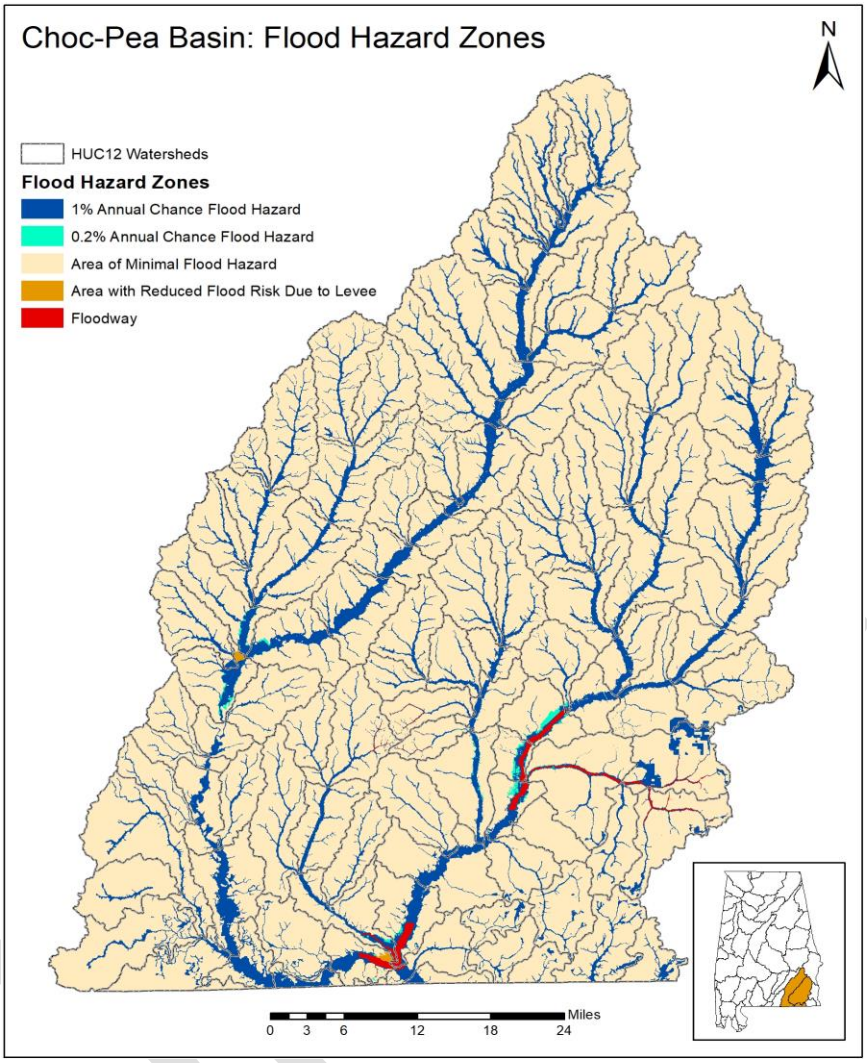

Figure 4-28: 100-Year and 500-Year Flood Hazard Zones

Through proper planning, floodplains can be managed to reduce the threat to human life, health, and property in ways that are environmentally sensitive. Most floodplains contain areas with valuable assets that sustain and enhance human existence. Some of these assets are agricultural and forest, food and fiber, fish and wildlife, temporary floodwater storage, parks and recreation, and environmental values. NRCS provides leadership and takes actions where practicable to conserve, preserve, and restore existing natural and beneficial functions and values in base (100-year) floodplains as part of the technical and financial assistance program that it administers.

4.15 Topography

The Choc-Pea Basin is characterized by gently rolling hills, sharp ridges, prairies, and alluvial flood plains (Clean Water Partnership (CWP) and GSA, 2005). Topography in the Choc-Pea Basin is generally level to undulating (see Figure 4-29). Elevation in the project area ranges from 62 ft to 692 ft above mean sea level (MSL). The southern region of the basin maintains most of the lower elevations in the area, thus higher topography and slopes can be seen in the Northern part of the basin. Much of the low topography and area of relief surrounds the Choctawhatchee and Pea Rivers. Average slope gradients are less than 29 percent, as can be seen in Figure 4-30.

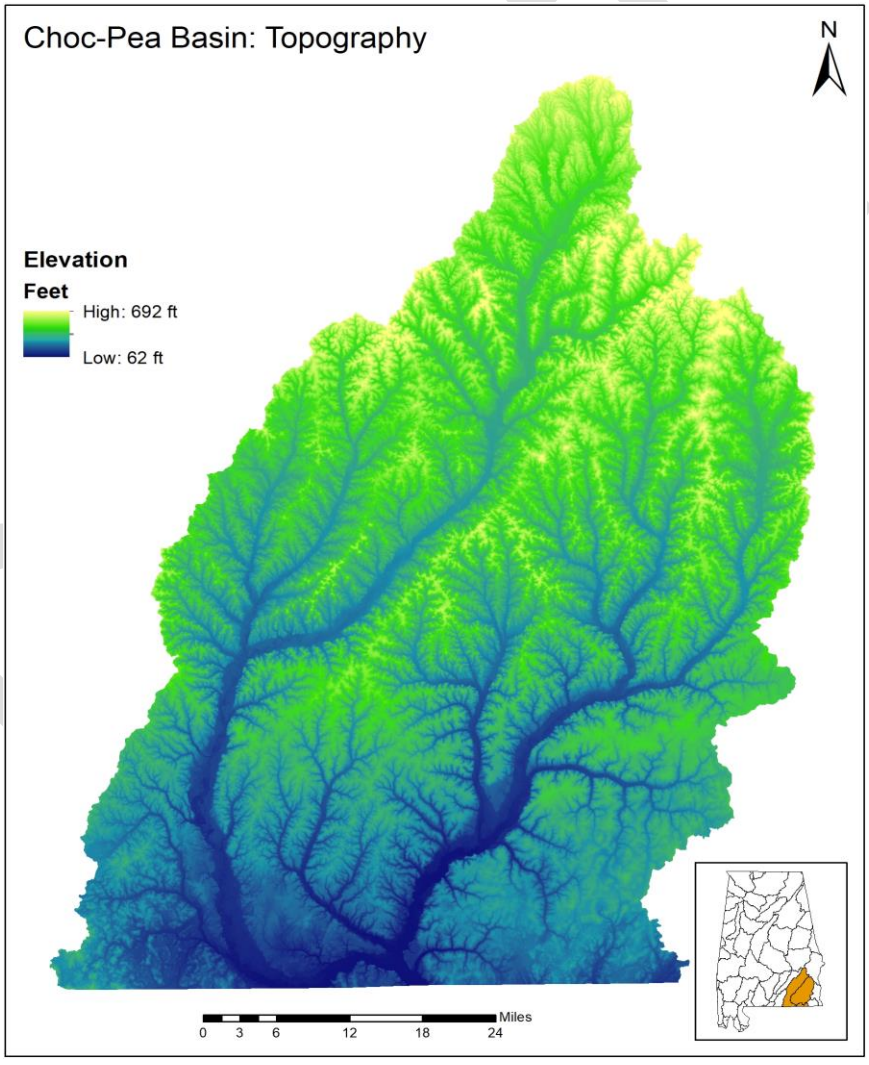

Figure 4-29: Topography in the Choc-Pea Basin

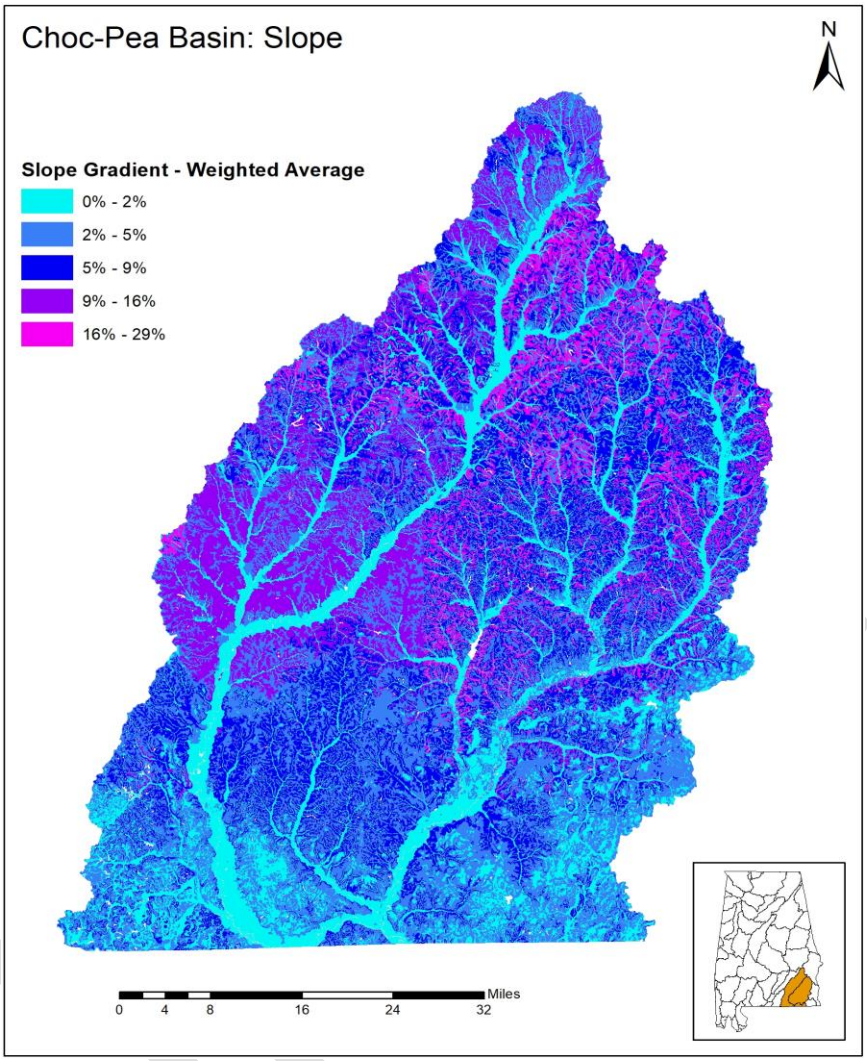

Figure 4-30: Slope Gradients Within Choc-Pea Basin

4.16 Climate

Monthly Normals

The Livneh et al. (2014) climate dataset has an original horizontal resolution of 1/16 degrees which contains daily values of minimum temperature, maximum temperature, and precipitation for the period 1915-2011. This daily data was area weighted to the HUC-8 regions of the United States. An area-weighted daily average was then calculated for the combined area of the Upper and Lower Choctawhatchee and Pea Watersheds. This data was further averaged to monthly values for the 30-year period 1981-2010 which is the current period for climate normals in the United States. These average monthly temperature values are displayed in Figure 4-31. The lowest minimum temperatures occur in December and January with values between 35 and 40 ºF. The highest maximum temperatures occur in July and August with values near 90 ºF. The average annual precipitation is about 57 inches with the maximum monthly value occurring in July of about 6.4 inches and the minimum monthly value occurring in October of about 3.3 inches (Figure 4-32). The unexpectedly high averages for July and September are most likely caused by tropical systems or hurricanes.

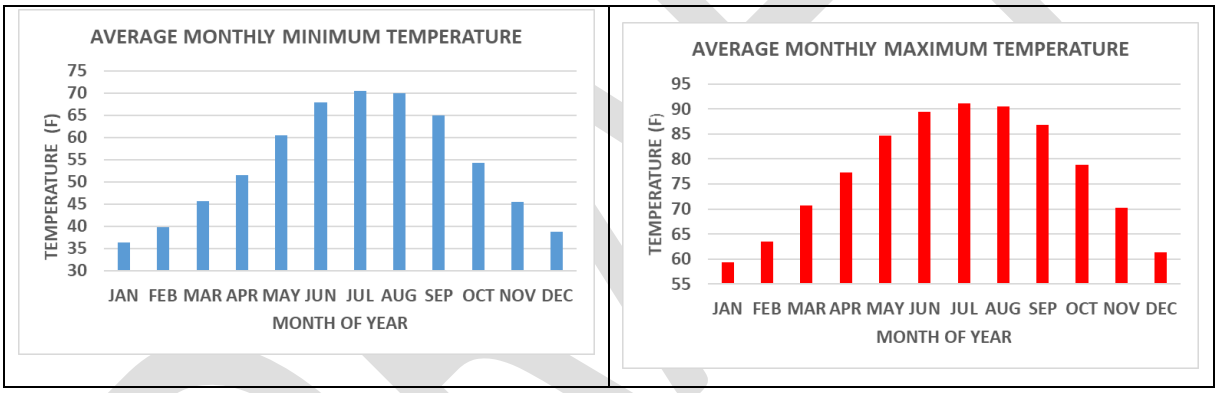

Figure 4-31: Average Monthly Minimum Temperature (left) and Maximum Temperature (right) in Units of ºF for the Choc-Pea Basin for the Period 1981-2010.

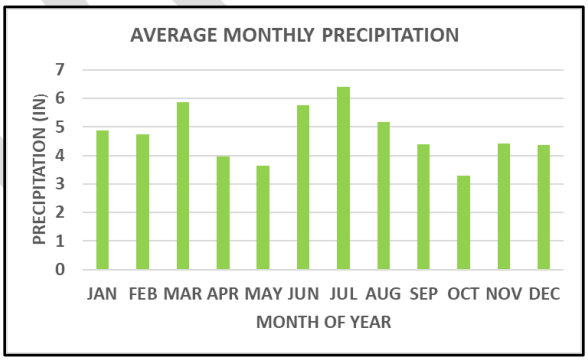

Figure 4-32: Average Monthly Precipitation in Units of Inches for the Choc-Pea Basin for the Period 1981-2010.

Daily Precipitation

The daily precipitation data from 1981-2010 for the Choc-Pea Basin was sorted from smallest to largest and the cumulative distribution function was calculated and shown in Figure 4-33. The period comprises 10,957 days which, when divided by 30 years, gives an average year length of 365.23 days, which is equivalent to 100 percent of the data. The vertical axis in Figure 4-33 is labeled with respect to the "average day" rather than percentages. The 1-inch threshold is at about day 356 which leads to the conclusion that about 98 percent of the time daily precipitation amounts are 1 inch or less. The National Weather Service threshold for measurable precipitation at a given location is 0.01 inches. This threshold is at about day 152, so about 213 days of the year have values at or above this amount.

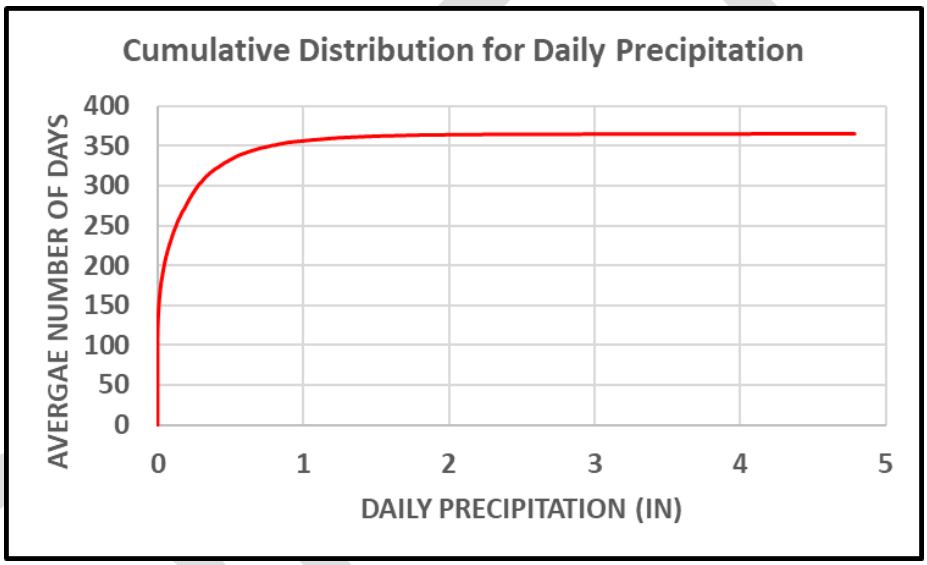

Figure 4-33: Cumulative Distribution Function for Daily Precipitation Values for the Choc-Pea Basin for the Period 1981-2010

*The horizontal axis is the precipitation amount in units of inches. The vertical axis is the average number of days.

5. Alternatives

5.1 Formulation Process

Numerous structural and non-structural measures were considered and evaluated in the formulation of alternative plans. Measures which had been determined either not feasible, unacceptable, or did not meet the needs of the area during feasibility studies were not considered in the general reevaluation. These measures included groundwater artificial recharge, intensified drilling of deeper aquifers, moving water across properties, and reallocation of storage in reservoirs and construction of large reservoirs. Engineering, environmental, economic, sociological, institutional, acceptability, and other factors were key in the formulation of alternatives to ensure that resources were not wasted in the development of unreasonable plans.

The process used to formulate alternatives was based on the primary objective of the SLO. The objective of this project is to minimize damage to plant health and vigor associated with untimely and unpredictable rainfall that impairs rainfed agricultural crop resilience in Alabama. Without adequate precipitation and supplemental water application, producers carry a very real risk of lost production. Over time, this lost production becomes unsustainable from both a resource and economic point. By developing diffuse or decentralized on-farm irrigation systems suitable for the farming practices in the Choc-Pea, the risk of production loss can be greatly reduced. The objective should be attained while avoiding or minimizing adverse environmental and cultural impacts. Additionally, alternatives were devised to meet the project's purpose of AWM, and further the conservation, development, utilization, and disposal of water through the expansion of agricultural water application. The federally assisted alternatives will represent works or practices needed to address the purpose and need for action, while providing the flexibility required for appropriately assessing specific practices at the site level. Given the potential diversity of application and need, the SLO does not wish to limit the flexibility in which this project will support agricultural land use in the form of sustainable expansion of diffused irrigation systems.

Per PL-566 policy and guidelines, project sponsors must have the legal authority and resources to carry out, operate, and maintain works of improvement (Public Law 83-566, Section 2 and Section 4(3)). Alternatives that are not within the scope of actions that ASWCC can entertain as the project sponsor, consistent with PL 83-566 authorities under which this plan was prepared, were eliminated from further study.

5.2 Alternatives Eliminated from Detailed Study

Alternatives that did not meet the purpose and need of the project or were determined not feasible as success is unlikely because of the high cost, potential for unacceptable environmental impacts, and contradictions with the main project goal were removed from subsequent more detailed evaluations. A summary of the alternatives eliminated, and the reason for elimination, is provided below.

5.2.1 Current/Conventional Expansion: Expansion of irrigation that supports 18/acre-inches per year.

The project would support storing the standard considered as a season's worth of water for irrigation. These larger ponds adhere to NRCS Technical Release (TR) 60 standard.

This alternative was not considered further as it would exceed environmental consequences beyond acceptable. This alternative would result in the loss of productive farmland which directly contradicts a main goal of this project. Furthermore, the costs required to implement this alternative would exceed available funding and would not meet this program's objectives.

5.3 Alternatives Description

The alternatives carried forward for further examination include the No-Action Alternative and the Sustainable Irrigation Expansion (SIE) Alternative (NED/Preferred). The alternatives were developed in detail and are evaluated in this section of the Watershed Plan-EA.

5.3.1 No-Action (Future without Project)

The Future Without Project Alternative (henceforth referred to as FWOP) would not provide federal support for the expansion of agricultural water application in the Choc-Pea Basin, and no action will be taken. This alternative would not meet the purpose and need for this project but is required by NEPA policy and regulations to be carried out in further detail within the subsequent Watershed Plan.

Agricultural production is expected to continue as a dominant economic activity within the Choc-Pea for the foreseeable future. Using UAH state irrigation survey data from 2006-2015, irrigated acreage has increased in the Choc-Pea Basin from a low of 9,565 acres (about 0.5 percent of the total agriculture area) to 22,171 acres (roughly about 1.44 percent of the total agriculture area), (Handyside, 2017). On average, this depicts a recent adoption trend of approximately 3,151 acres of new irrigated agriculture land per year. However, the first seven years of this study saw an average increase in irrigation of about 819 acres per year. A much higher rate of adoption occurred during 2013-2015 (6,876-acre increase), resulting in more than half of the total acres adopted during the nine-year period.

The spike in the nine-year average caused by the 2013-2015 data led from what would have been an 819 acre per year average to a 3,151 acre per year average across all nine years. The high variability and unexpected obstacles agricultural communities often face presents a problem of inaccuracy when trying to rely on recent irrigation adoption rates for the purpose of future forecasting.

Furthermore, the disparity between how the percentages are weighted should also be considered when attempting to estimate the progression and adoption trends within the basin. Though 1.44 percent of total agricultural land is higher than the previous 0.5 percent, it does not reflect the decrease in overall agricultural land, leading to a flawed, or perhaps deceiving, depiction of

improvement. According to USDA NASS 2017 Census data, an approximate 13 percent average decrease in the total agricultural acreage occurred between 2007 and 2017 within the nine counties making up the basin (USDA NASS, 2017). Similarly, the nine counties making up the Choc-Pea Basin experienced a 16 percent average decrease in total number of farms during 2007-2017 (USDA NASS, 2017). Likewise, according to the 2018 U.S. Census Bureau data, two counties in the Choc-Pea Basin are listed in the top 15 fastest growing counties by population in Alabama (USDA, 2018). Although much of the basin is considered as Alabama's prime agricultural land, the external evidence suggests the current land use and ownership patterns may change to favor developed land over agricultural land.

Currently, there is no other programmatic funding that would meet the purpose and need for expanding new, diffused irrigation systems. Considering the disparities presented by other factors such as land conversion, it cannot be assumed that farmers will continue adopting new irrigation or that irrigation adoption trends will remain constant over time. Therefore, forecasting future irrigation adoption cannot be done with great significance/accuracy and would likely be unreliable.

In all, the FWOP Alternative would not meet the need for federal support, nor would it support existing agricultural communities and the prime farmland in the Wiregrass region of Alabama. Additionally, it would not improve water quality or soil health through increased organic matter or uptake of in-field nutrients (improved nutrient use efficiency), as this does not occur on a rainfed crop during a drought.

5.3.2 Alternative No. 2 - Sustainable Irrigation Expansion (SIE) Above Current Adoption

The project would support the goal to minimize damage to plant health and vigor associated with untimely and unpredictable rainfall that impairs rainfed agricultural crop resilience in Alabama. The project would also improve water quality and soil health through increased organic matter and uptake of in-field nutrients (improved nutrient use efficiency), which does not occur on a rainfed crop during a drought.

Irrigated acreage within this area increased at an average of 3,151 acres per year from 2006-2015 (Handyside, 2017). Despite the variability involved in calculating the yearly average, the SIE Alternative is projected to increase that rate by forty percent (i.e., for a total increase of 4,200 acres per year) until available program funds are expended (approximately four years). Depending on farmer application needs, this alternative will allocate funding for the development or additions to water delivery/supply infrastructure and/or irrigation application equipment at the farm level; provided that previously rainfed acres are converted to newly irrigated acres. The irrigation practices that would be made available for cost-share include the following:

- Low Pressure Center Pivots
- Micro-Irrigation/Subsurface Drip
- Linear/Lateral Irrigation
- Tow/Traveler Irrigation

- Plasticulture
- Hand-Moved/Solid Set Sprinklers

The infrastructure that would be made available for cost-share include the following:

- Phased/Generator Electricity
- Practice 533 Power Units
- Practice 430 Pipes
- Practice 533 Pumps
- Practice 642 Well Development
- Practice 378 Conservation Practice Standard (cps) Pond
- Practice 378 Scenario #2: Embankment Pond with Pipe
- NRCS 436 cps Irrigation Reservoir
- Practice 436 Scenario #1: Irrigation Reservoir and Embankment Dam with on-site borrow
- Practice 436 Scenario #2: Irrigation Reservoir with Embankment Reservoir <= 30 Acre-Feet
- Practice 436 Scenario #6: Irrigation Reservoir and Excavated Pit

Furthermore, the SLO will offer a three-year irrigation management plan to all successful applicants which includes conservation agricultural equipment and a user-friendly interface for the farmer. This will be fully covered by the ASWCC. The equipment that will be offered for the purpose of promoting sustainable agricultural and conservative irrigation practices include the following:

- Flow meters
- Soil moisture sensors
- Variable rate irrigation (VRI) components
- Telemetry
- Scheduling assistance
- Weather station

Rather than narrowing each possible combination of proposed works and practices into separate alternatives, this SIE alternative will act as an “umbrella” to provide the necessary flexibility required for appropriately assessing specific practices at the unknown site level. There are three scenarios included within this “umbrella” Alternative. Each scenario is defined by what irrigation infrastructure will be eligible for cost-share.

Alternative 2a: Application Equipment

This scenario will provide funding for partial cost-share on irrigation infrastructures such as pipes, pumps, power, etc. as well as the following five application practices:

- CENTER PIVOT LOW PRESSURE: Telemetry, Pumping plant, Variable Rate/Speed Control, Pivot system/Benders/Corners, 3-phase electricity, GPS, Pipeline, Generator, Motors, Well /pump, Remote Management, Flow Meter

- MICRO-IRRIGATION: Telemetry, Buried drip tape, Chemical injection system, GPS, Flow meter, Filter System, Pipeline, Backflow preventer, Well/pump, Trenching earth
- LINEAR/LATERAL IRRIGATION SYSTEM: Linear/Lateral irrigation system, Telemetry, Pumping plant, Variable Rate/Speed Control, Pivot system/Benders/Corners, 3-phase electricity, GPS, Pipeline, Generator, Motors, Well /pump, Remote Management, Flow Meter
- TOW/TRAVELER SYSTEM: Telemetry, Trenching earth, Flow meter, Tow System, Pipeline
- PLASTICULTURE (MICRO IRRIGATION): Bedding of soil, Mulching (plastic), Drip system (Pipe and fittings), Well/pump

Alternative 2b: Well + Application Equipment

This scenario includes the practices listed in Alternative 2a, as well as the development of a well capable of driving a center pivot. In some locations of the basin, drilling deeper wells is more sustainable and less environmentally impactful than drilling into more shallow aquifers. Though deeper wells typically have higher costs, the SLO will offer additional cost-share at 75 percent, for the portion of the well added beyond shallow aquifers for the purpose of intentionally irrigating sustainably. Areas where this scenario may be desired will be considered during the ranking process using the down-dip lines, georeferenced plates, and aquifer specific information and characteristics. Pump tests will be required for all wells constructed within this scenario.

Alternative 2c: Pond + Shallow Well + Application Equipment

This scenario includes the practices listed in Alternative 2a, as well as the development of a Practice 378/436 Pond. Structure type selection (excavated pit, embankment, or tank) shall be based on a site-specific assessment involving hydrologic studies, engineering and geologic investigations, available construction materials, and natural storage. Design capacity computations shall be based on planned inflow volumes and rates over the storage period, and outflow volumes and rates required to meet planned irrigation system needs. Structure storage capacity must provide sufficient volume to meet variations in water demand within the irrigation period. This scenario assumes the construction of ponds will be limited to 378 CPS. The size of pond structure may depend on the productivity of the well (gpm).

The SIE Alternative contributes to the sponsors' objectives as follows:

- Minimize damage to resources of concern (plant health and vigor))
- Improve water conservation and irrigation efficiency on farms
- Improve water availability and reliability for agricultural production
- Improve water quality and soil health through uptake of in-field nutrients

- Increase organic matter to improve soil health and water-holding capacity
- Benefit rural agricultural communities
- Support existing agricultural production and land use

The maximum estimated project installation cost for the *SIE* Alternative is $41,304,508. The are Operation, Maintenance, and Replacement (OM&R) costs to be borne by producer are included in the crop enterprise budgets found in Appendix D, Section 5.1.

The selection of farm specific details will be planned to best meet farmer needs and onsite agency approval/recommendations. The irrigation water source must be large enough to provide sufficient water when it is needed. Because irrigation is not 100% efficient, the water supply rate must exceed the rate of crop use. Water requirements depend on the climate, crop, and the amount of available soil moisture (Penn State Extension, 2012). Project applications will be submitted by farmers to the SLO, and then ranked based on a variety of criteria. Once project applications have been ranked and selected site locations are known, an onsite EE (Environmental Evaluation, NRCS Form CPA-52) will be performed to evaluate the proposed actions further and address specific environmental effects and assurance of NED effects.

It is assumed that there will be an increase of 4,200 irrigated acres per year for four years through implementation of new irrigation infrastructure and/or practices. The rate of adoption, and irrigation equipment adopted, may be higher or lower depending on farmer preferences, access to water, and economic conditions. Uncertainty in the rate of adoption of irrigation influences the costs and benefits of the preferred alternative. Actual costs of irrigation may vary from farm to farm, depending on the type of equipment installed, creating uncertainty in the costs of the preferred alternative.

5.4 Summary and Comparison of Alternatives

Table 5-1 compares the No-Action/FWOP (Alternative 1) and the SIE Alternative (Alternative 2). The table summarizes measures addressed, installation costs, and economic effects. Environmental consequences and associated compliance and BMPs for each Alternative, and the three Scenarios for the SIE Alternative, are summarized in Section 6.11. The full NED Analysis is presented in Appendix D.

Table 5-1. Comparison of Alternatives

Watershed Plan Element	Item or Concern	Alt. 1: FWOP (No-Action)	Alt. 2: SIE
Measures to Address	Reliability of Water Availability and Delivery	Water delivery reliability for agriculture would not be improved as infrastructure and operations would not change.	Water delivery reliability for agriculture would improve for approved irrigators/farmers within the basin.

		ASWCC would continue to be unable to meet patron demands.	
	Regional and National Economic Benefit	There would not be a change in the current economic status within the region or nation from agricultural production alone.	The region would benefit economically through reduced flood insurance indemnities/claims.
	Damage to resource (plant health and vigor)	Resource damage occurs. Plant health and vigor would be reduced as the availability of water would remain unpredictable, especially during a drought.	Resource damage minimized. Resilience of plant health and vigor would be enhanced through the implementation of irrigation practices.
	Soil Health	There would be no improvements in soil health as management practices would not change.	Soil health would be improved through increased water-holding capacity, increased organic matter, and uptake of in-field nutrients (improved nutrient use efficiency), thus leading to improved water quality.
	Water Quality	There would be no improvements in water quality as management practices would not change.	Improved water quality would occur as a result of increased water holding capacity in soil, and improved nutrient use efficiency.
Installation Costs	NRCS Contribution	$0	$23,130,026
	Farmer Contribution	$0	$18,174,483
	Total	$0	$41,304,509
NED Account	Average Annual Cost Installation	$0	$2,145,985
	Annual Benefits	$0	$4,202,709
	Annual Costs	$0	$3,579,409
	Benefit to Cost Ratio	0	1.17
	Annual Remaining Flood Damage	N/A	N/A

Notes:
1. All Costs and Benefits presented in the table for the SIE Alternative are included as a change from the No-Action Alternative. Costs and Benefits for the No-Action Alternative are shown as $0 to represent there would be no change

to the existing costs and benefits.

2. Operation, maintenance and replacement responsibilities of the AWM Elements will be assumed by the producer. The approved producers will sign an O&M agreement for the AWM Elements concurrently with the Cost-Share agreement.

Regional Economic Development (RED) Account	**Beneficial Effects Annualized (2020$)**		
	Region	$0	$1,389,961
	Rest of Nation	N/A	N/A

	SOILS		
	Upland Erosion	Under rainfed farming, erosion from fields may occur during drought periods; eventual rainfall creates excessive runoff and erosion.	Potential for increased soil loss due to irrigation runoff. Runoff increases are minor, and effects would be short term and localized.
	Stream Bank Erosion	No effect	Potential for stream bank erosion during installation of surface water intake.
	Sedimentation	No effect	Potential for additional runoff by increasing irrigation, which might lead to more sediment transport.
	Prime and Unique Farmland	No effect	Potential for protection and enhancement by increasing irrigation.
	WATER		
	Surface Water Quantity	No effect	Impacts to local water resources are negligible to minor in intensity.
	Surface Water Quality	No effect	Water quality parameters such as turbidity and water clarity could be temporarily impacted due to land disturbing activities associated with the construction of irrigation delivery systems. However, supplemental irrigation can improve water quality through improved nutrient use efficiency.
	Groundwater Quantity	No effect	Impacts range from negligible to minor. If 10 percent of the aquifer production zone is irrigated (the 10

			percent scenario), the average irrigation demand for all aquifers considered productive would remain under 10 percent of recharge. This would be classified as a minor impact. Assuming all agricultural land in the aquifer production zone were irrigated, the recharge range would be between 13 percent and 15 percent for the six aquifers considered productive. This would be classified as moderate impact.
	Groundwater Quality	No effect	Irrigation may increase groundwater leaching in the case of over-irrigation or excess fertilization. However, irrigation applied in accordance with BMPs reduces the risk of groundwater leaching.
	Clean Water Act	No effect	CWA Section 404 responsibilities will be fulfilled, and landowners are responsible for obtaining permits prior to project implementation.
	Wetlands	No effect	Locations will be evaluated to determine impacts and any required mitigation measures will be implemented.
	Water Bodies	No effect	The Preferred Alternative will have minor effects on both the surface and groundwater supply.
	AIR		
	Air Quality	No effect	Given the relatively small areas and slight increase in application rates, models show impacts would be negligible and temporary
	PLANTS		
	Endangered and Threatened Species	No effect	The extent of potential impacts on T&E species is difficult to evaluate until specific project sites have been identified by the NRCS and

			the SLO. Any adverse effects can be effectively mitigated.
	Riparian Areas	No effect	There may be slight increases of runoff and nutrient loads at some sites near riparian areas. Sites will undergo evaluations to identify any potential risk to riparian zones and water supplies.
	ANIMALS		
	Fish and Wildlife Habitat	No effect	The extent of potential impacts on fish and aquatic resources is difficult to evaluate until specific project sites have been identified by the NRCS and the SLO. Any adverse effects can be effectively mitigated.
	Endangered and Threatened Species	No effect	The extent of potential impacts on T&E species is difficult to evaluate until specific project sites have been identified by the NRCS and the SLO. Any adverse effects can be effectively mitigated.
	HUMANS		
	Cost, NED	No effect	The Federally assisted plan will maximize net economic benefits and meet the required criteria by Economic & Environmental Principles and Guidelines (P&G).
	Historic and Cultural Resources	Assuming land use in the Choc-Pea Basin remains constant, affects to any archaeological resources located in rainfed fields are expected to be negligible to major; whereas affects to non-archaeological historic resources are expected to be negligible	The extent of potential impacts on cultural resources is difficult to evaluate until specific project sites have been identified by the NRCS and the SLO. Any adverse effects can be effectively mitigated.
	Local and Regional Economy	No effect	Moderate, positive impacts are expected due to the change in yield of agricultural products at the local level.

	Potable Water Supply	No effect	Once specific sites have been identified, an Environmental Evaluation (NRCS-CPA-52) will be done to identify any potential localized risk to water supply.

6. Environmental Consequences

This section presents the intensity threshold table used to quantify estimated effects to resources of concern because of the proposed alternative. See Table 6-1 for reasoning of each threshold as used for impact estimations.

The results of an action are estimated. These impacts are quantified using the following reasoning:

- Direct Effects are caused by the action and occur at the same time and place.
- Indirect Effects are caused by the action and occur later in time or farther removed in distance but are still reasonably foreseeable.
- Cumulative Effects results from the incremental impact of the action when added to the other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions.

The duration of effects is also estimated. These durations are estimated using the following reasoning:

- Seasonal - Effects which occur during a certain season or time of year.
- Temporary - Transitory effects which only occur over a period of days or months.
- Short-term Effects - lasting 1-5 years.
- Long-term Effects - lasting greater than 5 years.

Table 6-1. Intensity Threshold Table

Resource	Intensity Threshold			
	Negligible	**Minor**	**Moderate**	**Major**
Cultural Resources	Project activities would have no potential to affect a cultural resource. No known or heretofore unidentified resources are affected or are at the lowest levels of detection or barely perceptible, and not measurable.	Impacts to a cultural resource with little or no data potential. The historic context of the affected resource(s) would be local. No effect on the contributing element of a property eligible for the National Register of Historic Places. Causes a slight change to a natural or physical ethnographic resource, if measurable and localized.	Impacts to a cultural resource with modest data potential of local, regional or state significance. Changes a contributing element but would not diminish resource integrity or jeopardize National Register eligibility. Localized and measurable change to a natural or physical ethnographic resource.	Impacts to a cultural resource with high data potential of state, regional, and/or national significance. Diminishes the integrity of the resource to the extent that effects cannot be mitigated, would permanently impact the National Register eligibility of the resource, prevent a resource from meeting criteria for listing in the National Register, or reduce the ability of a cultural resource to convey its historic significance.Permanent severe change or exceptional benefit to a natural or physical ethnographic resource.
Fish and Aquatic Species	No discernable short- or long-term impacts to fish life or habitat.	Changes in watershed conditions that cause non- measurable change in existing hydrology or sediment functions. Direct or indirect habitat - changes that result only in non-measurable, short-term change in risk to ESA-listed and other fish species at the population or the Evolutionary Strategic Unit (ESU) scale.	Changes in watershed conditions that cause measurable change to hydrology or sediment functions. Direct or indirect habitat changes that cause measurable-, short- or long-term change in risk to ESA-listed or other fish species at the population or ESU scale.	Changes in watershed conditions that cause high impairment to hydrology or sediment functions that affect population viability. The proposed action would likely jeopardize a species' continued existence or destroy or adversely affect a species' critical habitat.

Table 6-1. Intensity Threshold Table

Resource	Intensity Threshold			
	Negligible	**Minor**	**Moderate**	**Major**
Geology and Soils	Project activities would not disturb soils or underlying geology.	Short-term erosion during construction at project and clearing sites that would be mitigated through BMPs. Changes to primarily previously disturbed soil profiles or underlying geology.	Short-term erosion during - construction at project and clearing sites that could not be mitigated. Changes to primarily undisturbed soil profiles or underlying geology.	Continued erosion during and after construction at project and clearing sites. Permanent changes to undisturbed soil profiles or underlying geology.
Land Use	Existing land uses or ownership would continue as before. A short-term change or interruption to land use or access to existing land uses.	Land use changes that are consistent with existing ownership, easements, or right-of-way.	Land use changes that are inconsistent with existing ownership, easements, or right-of-way but are compatible with adjacent land use.	A new unauthorized land use or access that is not compatible with adjacent land use.
Public Safety	No change in risk to human health and safety.	Any short-term risks to public health and safety could be mitigated. Eliminate a known health and safety condition in localized areas.	Any short-term risks to public health and safety could not be mitigated. Eliminate known health and safety conditions in the area affected by District operations.	Create a permanent and known health and safety condition. Eliminate a known health and safety condition on a regional level.
Recreation	No effect on the location, timing, or	Temporarily preclude or limit dispersed and dedicated	Temporarily preclude or limit dispersed and dedicated	Obstruct legally existing or planned dispersed recreational uses after project construction.

Table 6-1. Intensity Threshold Table

Resource	Intensity Threshold			
	Negligible	**Minor**	**Moderate**	**Major**
	quality of recreation facilities and uses during and after construction.	recreational opportunities during off- peak use periods during project construction. Require relocation of dispersed recreational activities to an equal or better location after project construction. Expand to a limited degree existing recreational areas or opportunities.	recreational opportunities during peak use periods during project construction. Create or encourage new unauthorized land uses along the right-of-way for recreational purposes, such as ATV use in unauthorized areas. Create limited dispersed new recreational areas or opportunities.	Alter or eliminate dedicated recreation opportunities after project construction. Create extensive new recreational opportunities or areas.
Socioeconomics	No reduction in the yield of agricultural products or timber Non-measurable change to income and/or employment levels.	Little effect on the yield of agricultural products or timber. Temporary changes to income and/or local employment levels.	A change to the yield of agricultural products or timber at the local level Permanent changes to local employment and/or levels.	A change to the yield of agricultural products or timber at the regional or national level. Permanent changes to regional employment and/or income levels.
Vegetation	Project activities would not affect vegetation, or effects would be limited to small areas.	Most effects would be - localized and/or temporary. While individual plants could be affected, there would be no effects on a population scale. Any permanent effects would not	A large proportion of one or more populations are affected but relatively localized and could be mitigated. Any effects to sensitive species could be mitigated.	Considerable effects to plant populations over large areas. Extensive mitigation required to offset adverse effects to sensitive species, but success not assured.

Table 6-1. Intensity Threshold Table

Resource	Intensity Threshold			
	Negligible	**Minor**	**Moderate**	**Major**
		be widespread, nor would they affect sensitive species or populations.		
Visual Resources	Project features are visually negligible or not visible.	Landscape is a designated scenic area and project features do not attract attention to the landscape. The majority of project features do not attract attention to the landscape. Short-term visual changes during project construction.	Landscape is a designated scenic area and some project features attract attention to the landscape. A majority of project features attract attention to the landscape.	Landscape is a designated scenic area and the majority of project features attract attention to the landscape. Project features create a disruptive change and dominate the landscape.
Water Resources	Project activities would not disturb or alter water quantity, water quality, or groundwater quantity.	*Surface Water Quantity*: Less than 10 percent change in volume of streamflow. *Water Quality:* Short-term or non- measurable changes to water quality in water bodies that are unlikely to result in excursions to water quality standards on the Alabama 303(d) list. *Ground Water*: Long-term, less than 10 percent change in depth to groundwater.	*Surface Water Quantity:* Greater than 10 percent and less than 20 percent change in volume of streamflow. *Water Quality*: Permanent measurable changes to water quality in water bodies that is unlikely to result in excursions to water quality standards on the Alabama 303(d) list. *Ground Water:*	*Surface Water Quantity:* Greater than 20 percent change in volume of streamflow. *Water Quality:* Permanent measurable changes to water quality in water bodies that results in excursions to water quality standards on the Alabama 303(d) list. *Ground Water:* Long-term, greater than 10 percent change in depth to groundwater.

Table 6-1. Intensity Threshold Table

Resource	Intensity Threshold			
	Negligible	**Minor**	**Moderate**	**Major**
			Short-term, greater than 10 percent change in depth to groundwater.	
Wetland, Flood Plains, Riparian Zones	Does not alter wetlands or change the hydraulic capacity of floodplains.	Alteration of non- jurisdictional wetland hydrology, vegetation, and/or soils results in changes to hydrologic, habitat, and/or water quality functions. Altered hydraulic function or hydraulic capacity of floodplains to a degree that does not increase or decrease the potential for flooding and damage to personal property.	Mitigated alteration of jurisdictional wetland hydrology, vegetation, and/or soils that result in changes to hydrologic, habitat, and/or water quality functions.	Permanent, non-mitigated alteration of jurisdictional wetland hydrology, vegetation, and/or soils that results in changes to hydrologic, habitat, and/or water quality functions. Altered hydraulic function or changes to hydraulic capacity of floodplains to a degree that changes the potential for flooding and damage to personal property.
Wildlife	Temporary or short-term change in wildlife populations and/or habitats would not be measurable.	Long-term changes in wildlife populations or habitats would not be measurable. Any adverse effects can be effectively mitigated.	Long-term measurable changes in local wildlife populations or habitats. Mitigated effects to sensitive species.	Long-term measurable changes to regional wildlife populations or habitats. Effects to sensitive species could not be mitigated successfully.
Wild and Scenic Rivers	No effects on the resources determining the	Effects on resources would be compatible with the designation of the Wild and Scenic River reaches.	An effect on resources that would be incompatible with the designation but could be mitigated.	Effects on resources that would change the designation of a Wild and Scenic River reach.

Table 6-1. Intensity Threshold Table

Resource	Intensity Threshold			
	Negligible	**Minor**	**Moderate**	**Major**
	designation of Wild and Scenic Rivers.			

6.1 Cultural Resources

6.1.1 No-Action (Future without Project)

6.1.1.1 Archaeological Resources

Under rainfed farming, erosion from fields can result due to drought periods. This is because crops do not develop root structure to stabilize soils during these drought periods, leaving the land potentially fallow with no cover. Eventual rainfall creates excessive runoff and erosion, which can affect surface soils that protect underlying archaeological deposits. Assuming land use in the Choc-Pea Basin remains constant, affects to any previously identified and heretofore unidentified archaeological resources located in rainfed fields are expected to be negligible to major under this alternative.

6.1.1.2 Historical Resources

The 16 historic properties listed in the NRHP and identified within the basin area includes one historic object (a monument), one historic district, and fourteen historic buildings, one of which is also designated a NHL (NPS, 2019). Thirty-seven resources listed in the ARLH were identified and include homes, schools, churches and associated cemeteries, mills, and districts, among others (AHC, 2019a). A total of 319 named cemeteries have been identified thus far within the basin area, and thirty-six cemeteries are listed on the AHCR (AHC, 2019b). Assuming land use in the Choc-Pea Basin remains constant, affects to any known or heretofore unidentified, non-archaeological historic resources beyond existing conditions are expected to be negligible.

6.1.2 Preferred Alternative

6.1.2.1 Archaeological Resources

Alternative 2a: The extent of potential impacts on archaeological resources is difficult to evaluate until specific project sites have been identified by the NRCS and the SLO. All available data concerning historic and cultural resources have been provided as guidance and overview as specific project sites are identified. After selection, each project will also undergo a site-specific evaluation and review process, as outlined in the Environmental Evaluation Worksheet (NRCS-CPA-52), Alabama NRCS Cultural Resources Review form, and the SPPA between the Alabama NRCS State Office and the AHC. Expanding Irrigation will utilize conservation practices, some of which may be ground disturbing. For any potentially ground disturbing practices, stipulations and procedures outlined in the SPPA will be followed in accordance with the agreement. Per the SPPA, NRCS-AL will avoid adverse effects to historic properties whenever possible. Such avoidance efforts may include modifying or moving the undertaking. The site-specific evaluation and review process should ensure there are no known or heretofore unknown archaeological resources that are adversely affected. Based on this approach, the anticipated impacts are expected to be negligible to minor.

Alternative 2b: The extent of potential impacts on archaeological resources is difficult to evaluate until specific project sites have been identified by the NRCS and the SLO. All available data concerning historic and cultural resources have been provided as guidance and overview as specific project sites are identified. After selection, each project will also undergo a site-specific evaluation and review process, as outlined in the Environmental Evaluation Worksheet (NRCS-CPA-52), Alabama NRCS Cultural Resources Review form, and the SPPA between the Alabama NRCS State Office and the AHC. Expanding Irrigation will utilize conservation practices, some of which may be ground disturbing. For any potentially ground disturbing practices, stipulations and procedures outlined in the SPPA will be followed in accordance with the agreement. Per the SPPA, NRCS-AL will avoid adverse effects to historic properties whenever possible. Such avoidance efforts may include modifying or moving the undertaking. The site-specific evaluation and review process should ensure there are no known or heretofore unknown archaeological resources that are adversely affected. Based on this approach, the anticipated effects are expected to be negligible to minor.

Alternative 2c: The extent of potential impacts on archaeological resources is difficult to evaluate until specific project sites have been identified by the NRCS and the SLO. All available data concerning historic and cultural resources have been provided as guidance and overview as specific project sites are identified. After selection, each project will also undergo a site-specific evaluation and review process, as outlined in the Environmental Evaluation Worksheet (NRCS-CPA-52), Alabama NRCS Cultural Resources Review form, and the SPPA between the Alabama NRCS State Office and the AHC. Expanding Irrigation will utilize conservation practices, some of which may be ground disturbing. For any potentially ground disturbing practices, stipulations and procedures outlined in the SPPA will be followed in accordance with the agreement. Per the SPPA, NRCS-AL will avoid adverse effects to historic properties whenever possible. Such avoidance efforts may include modifying or moving the undertaking. The site-specific evaluation and review process should ensure there are no known or heretofore unknown archaeological resources that are adversely affected. Based on this approach, the anticipated impacts are expected to be negligible to minor.

6.1.2.2 Historical Resources

Alternative 2a: The extent of potential impacts on historic resources is difficult to evaluate until specific project sites have been identified by the NRCS and the SLO. All available data concerning historic and cultural resources have been provided as guidance and overview as specific project sites are identified. After selection, each project will also undergo a site-specific evaluation and review process, as outlined in the Environmental Evaluation Worksheet (NRCS-CPA-52), Alabama NRCS Cultural Resources Review form, and the SPPA between the Alabama NRCS State Office and

the AHC. Expanding Irrigation will utilize conservation practices, some of which may be ground disturbing. For any potentially ground disturbing practices, stipulations and procedures outlined in the SPPA will be followed in accordance with the agreement. Per the SPPA, NRCS-AL will avoid adverse effects to historic properties whenever possible. Such avoidance efforts may include modifying or moving the undertaking. The site-specific evaluation and review process should ensure there are no known or heretofore unknown cultural and historic resources that are adversely affected. Based on this approach, the anticipated impacts are expected to be negligible to minor.

Alternative 2b: The extent of potential impacts on historic resources is difficult to evaluate until specific project sites have been identified by the NRCS and the SLO. All available data concerning historic and cultural resources have been provided as guidance and overview as specific project sites are identified. After selection, each project will also undergo a site-specific evaluation and review process, as outlined in the Environmental Evaluation Worksheet (NRCS-CPA-52), Alabama NRCS Cultural Resources Review form, and the SPPA between the Alabama NRCS State Office and the AHC. Expanding Irrigation will utilize conservation practices, some of which may be ground disturbing. For any potentially ground disturbing practices, stipulations and procedures outlined in the SPPA will be followed in accordance with the agreement. Per the SPPA, NRCS-AL will avoid adverse effects to historic properties whenever possible. Such avoidance efforts may include modifying or moving the undertaking. The site-specific evaluation and review process should ensure there are no known or heretofore unknown cultural and historic resources that are adversely affected. Based on this approach, the anticipated impacts are expected to be negligible to minor.

Alternative 2c: The extent of potential impacts on historic resources is difficult to evaluate until specific project sites have been identified by the NRCS and the SLO. All available data concerning historic and cultural resources have been provided as guidance and overview as specific project sites are identified. After selection, each project will also undergo a site-specific evaluation and review process, as outlined in the Environmental Evaluation Worksheet (NRCS-CPA-52), Alabama NRCS Cultural Resources Review form, and the SPPA between the Alabama NRCS State Office and the AHC. Expanding Irrigation will utilize conservation practices, some of which may be ground disturbing. For any potentially ground disturbing practices, stipulations and procedures outlined in the SPPA will be followed in accordance with the agreement. Per the SPPA, NRCS-AL will avoid adverse effects to historic properties whenever possible. Such avoidance efforts may include modifying or moving the undertaking. The site-specific evaluation and review process should ensure there are no known or heretofore unknown cultural and historic resources that are adversely affected. Based on this approach, the anticipated impacts are expected to be negligible to minor.

6.1.3 Compliance and Best Management Practices

NRCS-AL ensures compliance with the NHPA by using alternate procedures stipulated under a SPPA between the NRCS-AL state office and the AHC (NRCS-AL, 2017), as authorized by the ACHP under 36 CFR Part 800.14(b)(4) of the regulations implementing "Section 106" of the NHPA (see Donaldson, 2014).

In accordance with the SPPA, NRCS-AL will comply with the following procedures for post-review discoveries of cultural resources or historic properties and unanticipated effects to historic properties outlined in the agreement:

a. Where construction has not yet begun and a cultural resource is discovered after Section 106 review is complete, the Alabama NRCS shall consult to seek avoidance or minimization strategies in consultation with the AHC to resolve adverse effects in accordance with 36 CFR Part 800.6.
b. The Alabama NRCS shall ensure that every contract for assistance includes provisions for halting work/construction in the area when potential historic properties are discovered or unanticipated effects to historic properties are found after implementation, installation, or construction has begun. When such a discovery occurs, the producer who is receiving financial assistance or their contractor shall immediately notify the Alabama NRCS State Conservationist's Office, CRS, supervisory NRCS personnel for the area, and the landowner/applicant.
    1. Alabama NRCS CRS shall inspect the discovery within 24 hours, if weather permits, and in consultation with the local Alabama NRCS official (Field Office supervisor or District or Area Conservationist), concerned Indian tribes, the AHC, the Alabama NRCS State Engineer or Alabama NRCS Assistant State Conservationist for Programs, as appropriate), the client (landowner/producer or whomever NRCS is assisting), the Alabama CRS, CRC or State Conservationist shall establish a protective buffer zone surrounding the discovery. This action may require inspection by AHC staff and tribal experts in addition to the CRS.
    2. All Alabama NRCS contact with media shall occur only under the direction of the Alabama NRCS Public Affairs Officer, as appropriate, and the Alabama State Conservationist.
    3. Security shall be established to protect the resources/historic properties, workers, and private property. Local law enforcement authorities will be notified in accordance with applicable State law and NRCS policy in order to protect the resources. Construction and/or work may resume outside the buffer only when the Alabama State Conservationist determines it is appropriate and safe for the resources and workers.
    4. The Alabama NRCS shall notify the AHC and the ACHP no later than 48 hours after the discovery and describe Alabama NRCS' assessment of the National Register eligibility of the property, as feasible as well as proposed actions to resolve any adverse effects to historic properties. The eligibility determination may require the assessment and advice of concerned Indian

tribes, the AHC, and technical experts (such as historic landscape architects) not employed by NRCS.

5. The AHC and ACHP shall respond within 48 hours from receipt of the notification with any comments on the discovery and proposed actions.
6. Alabama NRCS shall take any comments provided into account and carry out appropriate actions to resolve any adverse effects.
7. Alabama NRCS shall provide a report to the AHC and the ACHP of the actions when they are completed.

c. When human remains are discovered, the Alabama NRCS shall follow all applicable federal, tribal, and state burial laws and ordinances, including the Native American Graves Protection and Repatriation Act, and implementing regulations, when on tribal or federal lands, and related human rights and health statutes, where appropriate. Alabama NRCS shall also refer to the ACHP's Policy Statement regarding Treatment of Burial Sites, Human Remains and Funerary Objects and the ACHP' s Section 106 Archaeology Guidance. Alabama NRCS shall also follow USDA and NRCS policy on treatment of human remains and consultation.

6.2 Fish and Aquatic Resources

6.2.1 No-Action (Future without Project)

6.2.1.1 General Fish and Aquatic Species

Assuming land use in the Choc-Pea Basin remains constant, current trends show land use changing to urban over agricultural, which increases pressure on fish and aquatic species.

6.2.1.2 Federally Listed Fish and Aquatic Species

Assuming land use in the Choc-Pea Basin remains constant, current trends show land use changing to urban over agricultural, which increases pressure on fish and aquatic species.

6.2.2 Preferred Alternative

6.2.2.1 General Fish and Aquatic Species

Alternative 2a: Development and disturbance in watersheds can directly or indirectly impact habitats used by fish and other aquatic species. Changes in habitat conditions may be ephemeral and present short-term risk to aquatic populations, or they may be permanent and significantly alter the watershed’s ability to support a diverse range of aquatic life. The extent of potential impacts on fish and aquatic resources is difficult to

evaluate until specific project sites have been identified by the NRCS and the SLO. Each of the project-approved practices results in a "no effect", "mitigating action", and/or specific "on-farm consult". Based on this tiered approach, the anticipated effects are expected to be negligible to minor.

Alternative 2b: Development and disturbance in watersheds can directly or indirectly impact habitats used by fish and other aquatic species. Changes in habitat conditions may be ephemeral and present short-term risk to aquatic populations, or they may be permanent and significantly alter the watershed's ability to support a diverse range of aquatic life. The extent of potential impacts on fish and aquatic resources is difficult to evaluate until specific project sites have been identified by the NRCS and the SLO. Each of the project-approved practices results in a "no effect", "mitigating action", and/or specific "on-farm consult". Based on this tiered approach, the anticipated effects are expected to be negligible to minor.

Alternative 2c: Development and disturbance in watersheds can directly or indirectly impact habitats used by fish and other aquatic species. Changes in habitat conditions may be ephemeral and present short-term risk to aquatic populations, or they may be permanent and significantly alter the watershed's ability to support a diverse range of aquatic life. The extent of potential impacts on fish and aquatic resources is difficult to evaluate until specific project sites have been identified by the NRCS and the SLO. Each of the project-approved practices results in a "no effect", "mitigating action", and/or specific "on-farm consult". Based on this tiered approach, the anticipated effects are expected to be negligible to minor.

6.2.2.2 Federally Listed Fish and Aquatic Species

Alternative 2a: Development and disturbance in watersheds can directly or indirectly impact habitats used by fish and other aquatic species. Changes in habitat conditions may be ephemeral and present short-term risk to aquatic populations, or they may be permanent and significantly alter the watershed's ability to support a diverse range of aquatic life. Threatened and endangered species may be especially sensitive to changes in watershed conditions. The extent of potential impacts on federally listed fish and other aquatic species is difficult to evaluate until specific project sites have been identified by the NRCS and the SLO. Measures have been and will continue to be taken to prevent negative impact on federally listed fish and aquatic species. The SHU data will help inform NRCS personnel during specific project site evaluations of possible conflict or intersection. Any effects can be minimized through mitigation efforts. Each of the project-approved practices results in a "no effect", "mitigating action", and/or specific "on-farm consult". Based on this tiered approach, the anticipated effects are expected to be negligible to minor.

Alternative 2b: Development and disturbance in watersheds can directly or indirectly impact habitats used by fish and other aquatic species. Changes in habitat conditions may be ephemeral and present short-term risk to aquatic populations, or they may be

permanent and significantly alter the watershed's ability to support a diverse range of aquatic life. Threatened and endangered species may be especially sensitive to changes in watershed conditions. The extent of potential impacts on federally listed fish and other aquatic species is difficult to evaluate until specific project sites have been identified by the NRCS and the SLO. Measures have been and will continue to be taken to prevent negative impact on federally listed fish and aquatic species. The SHU data will help inform NRCS personnel during specific project site evaluations of possible conflict or intersection. Any effects can be minimized through mitigation efforts. Each of the project-approved practices results in a "no effect", "mitigating action", and/or specific "on-farm consult". Based on this tiered approach, the anticipated effects are expected to be negligible to minor.

Alternative 2c: Development and disturbance in watersheds can directly or indirectly impact habitats used by fish and other aquatic species. Changes in habitat conditions may be ephemeral and present short-term risk to aquatic populations, or they may be permanent and significantly alter the watershed's ability to support a diverse range of aquatic life. Threatened and endangered species may be especially sensitive to changes in watershed conditions. The extent of potential impacts on federally listed fish and other aquatic species is difficult to evaluate until specific project sites have been identified by the NRCS and the SLO. Measures have been and will continue to be taken to prevent negative impact on federally listed fish and aquatic species. The SHU data will help inform NRCS personnel during specific project site evaluations of possible conflict or intersection. Any effects can be minimized through mitigation efforts. Each of the project-approved practices results in a "no effect", "mitigating action", and/or specific "on-farm consult". Based on this tiered approach, the anticipated effects are expected to be negligible to minor.

6.2.3 Compliance and Best Management Practices

The project area overlaps designated Critical Habitat for one fish and five freshwater mussels federally listed species: Gulf sturgeon (*Acipenser oxyrinchus desotoi*), Choctaw bean (*Villosa choctawensis*), fuzzy pigtoe (*Pleurobema strodeanum*), southern kidneyshell (*Ptychobranchus jonesi*), southern sandshell (*Hamiota australis*), and tapered pigtoe (*Fusconaia burkei*). Per the ESA, organizations are required to consult with the USFWS if listed species or designated Critical Habitat may be affected by a proposed project. There are defined procedures for listing species, designating critical habitat for listed species, and preparing recovery plans, if necessary. The ESA requires federal agencies to evaluate the likely effects of the proposed project and ensure that it neither risked the continued existence of federally listed ESA species, nor results in the destruction or adverse modification of designated Critical Habitat.

All requirements of the USFWS-NRCS Informal ESA Consultation for federally listed species will be followed. Endangered Species Act Section 7(a) consultation will occur, if necessary, to develop or

negotiate reasonable and prudent measures to mitigate potential negative impacts. Examples include: Avoid altering hydrology of ephemeral drains (avoid logging during wet weather) within the FWS habitat; Increase buffer distance as needed to maintain the ecological and structural integrity of the riparian buffer and stream bank; Avoid crossing streams when using an irrigation water conveyance practice.

6.3 Geology and Soils

6.3.1 No-Action (Future without Project)

6.3.1.1 Geology

Assuming land use in the Choc-Pea Basin remains constant, the No Action alternative is unlikely to have considerable effects on geology.

6.3.1.2 Soils

Under rainfed farming, erosion from fields can result during drought periods. This is because crops do not develop root structure to stabilize soils during these drought periods, leaving the land potentially fallow with no cover. Eventual rainfall creates excessive runoff and erosion.

6.3.2 Preferred Alternative

6.3.2.1 Geology

Alternative 2a: The Preferred Alternative would result in minor soil disturbance during the installation period. Soil disturbances would be minor, as these effects would be short-term and localized to the irrigation installation site. Effects would be further minimized if necessary, through implementation of soil stabilization measures during installation. The Preferred Alternative may result in increased runoff that could also carry sediment. Effects will be mitigated through NRCS conservation practices as part of the site selection process. Sites identified for implementation will also undergo onsite evaluations as outlined in the Environmental Evaluation Worksheet (NRCS-CPA-52) to identify and resolve additional mitigation measures required to reduce erosion. Anticipated effects are expected to be minor.

Alternative 2b: The Preferred Alternative would result in minor soil disturbance during the installation period. Soil disturbances would be minor, as these effects would be short-term and localized to the irrigation installation site. Effects would be further minimized if necessary, through implementation of soil stabilization measures during installation. The Preferred Alternative may result in increased runoff that could also carry sediment. Effects will be mitigated through NRCS conservation practices as part of the site selection process. Sites identified for implementation will also undergo

onsite evaluations as outlined in the Environmental Evaluation Worksheet (NRCS-CPA-52) to identify and resolve additional mitigation measures required to reduce erosion. Anticipated effects are expected to be minor.

Alternative 2c: The Preferred Alternative would result in minor soil disturbance during the installation period. Soil disturbances would be minor, as these effects would be short-term and localized to the irrigation installation site. Effects would be further minimized if necessary, through implementation of soil stabilization measures during installation. The Preferred Alternative may result in increased runoff that could also carry sediment. Effects will be mitigated through NRCS conservation practices as part of the site selection process. Sites identified for implementation will also undergo onsite evaluations as outlined in the Environmental Evaluation Worksheet (NRCS-CPA-52) to identify and resolve additional mitigation measures required to reduce erosion. Anticipated effects are expected to be minor.

6.3.2.2 Soils

Alternative 2a: Erosion from irrigated fields can result from numerous reasons. Methods that directly flood parts or all of the field (e.g., surface or border irrigation) can carry large amounts of sediment off the field when drained or applied improperly. The increase in natural runoff that can accompany irrigation could also carry sediment from the field. In this case, the amount of erosion, or sediment flushing, would be highly dependent on several conditions including irrigation technology used, the amount and intensity of rainfall and runoff, the erodibility of the soil, and the slope of the field. For example, tow irrigation systems can have instantaneous application rates that exceed soil infiltration rates resulting in erosion. Indirect effects may include waterlogging.

The purpose of irrigation is to maintain the soil moisture of agricultural fields at an optimum level for plant growth during dry periods. The stabilization of soil moisture from irrigation may increase runoff during rainstorms and smaller rain events that typically would not have runoff. Runoff increases are minor, and the irrigated area is small compared to the watershed area as a whole. The small increases in runoff are not expected to degrade downstream habitats or increase flood levels.

Temporary impacts may occur when trenching for irrigation delivery systems.

Alternative 2b: Erosion from irrigated fields can result from numerous reasons. Methods that directly flood parts or all of the field (e.g., surface or border irrigation) can carry large amounts of sediment off the field when drained or applied improperly. The increase in natural runoff that can accompany irrigation could also carry sediment from the field. In this case, the amount of erosion, or sediment flushing, would be highly dependent on several conditions including irrigation technology used, the amount and intensity of rainfall and runoff, the erodibility of the soil, and the slope of the field. For example, tow irrigation systems can have instantaneous application

rates that exceed soil infiltration rates resulting in erosion. Indirect effects may include waterlogging.

The purpose of irrigation is to maintain the soil moisture of agricultural fields at an optimum level for plant growth during dry periods. The stabilization of soil moisture from irrigation may increase runoff during rainstorms and smaller rain events that typically would not have runoff. Runoff increases are minor, and the irrigated area is small compared to the watershed area as a whole. The small increases in runoff are not expected to degrade downstream habitats or increase flood levels.

Temporary impacts may occur when trenching for irrigation delivery systems. The potential direct negative environmental impacts of the use of groundwater for irrigation arise from over-extraction, waterlogging and salinization of soils which all have mitigating strategies.

Alternative 2c: Erosion from irrigated fields can result from numerous reasons. Methods that directly flood parts or all of the field (e.g., surface or border irrigation) can carry large amounts of sediment off the field when drained or applied improperly. The increase in natural runoff that can accompany irrigation could also carry sediment from the field. In this case, the amount of erosion, or sediment flushing, would be highly dependent on several conditions including irrigation technology used, the amount and intensity of rainfall and runoff, the erodibility of the soil, and the slope of the field. For example, tow irrigation systems can have instantaneous application rates that exceed soil infiltration rates resulting in erosion. Indirect effects may include waterlogging.

The purpose of irrigation is to maintain the soil moisture of agricultural fields at an optimum level for plant growth during dry periods. The stabilization of soil moisture from irrigation may increase runoff during rainstorms and smaller rain events that typically would not have runoff. Runoff increases are minor, and the irrigated area is small compared to the watershed area as a whole. The small increases in runoff are not expected to degrade downstream habitats or increase flood levels.

Temporary impacts may occur when trenching for irrigation delivery systems. The construction of irrigation ponds could disturb soils and increase erosion during construction. Management practice such as silt fences and bank stabilization can mitigate these impacts.

6.3.3 Compliance and Best Management Practices

The Food and Agriculture Organization (FAO), USDA, USGS, and several state agriculture departments have published Best Management Practices for irrigation agriculture. FAO Irrigation and Drainage Papers 56, 24 and 33 address responsible management of irrigation waters. In general, any non-beneficial uses of irrigation water have the potential for negative consequences and should be avoided. Non-beneficial uses of irrigation water include deep percolation (below the root zone),

uncollected surface runoff, evaporation from soil surfaces, or allowing water to reach areas outside of the field. BMPs attempt to address these issues through responsible management of irrigation systems. This may include the following steps: understanding the soil properties of the field, knowing the water requirements of the particular crop being irrigated, designing and operating the proper irrigation system for the situation (soils, crops, and topography), scheduling the irrigation cycles with proper knowledge, monitoring the irrigation system regularly, and taking into account the water quality of the irrigation water, particularly the nitrogen content. If these steps are followed properly then undesirable consequences can be avoided, such as overirrigation leading to deep percolation, or groundwater leaching, surface runoff leading to erosion from the field, increased soil salinity from drying, and increased residual nitrogen left in the soil after harvesting.

6.4 Land Use

6.4.1 No-Action (Future without Project)

Land use changes are expected to remain consistent with existing ownership, easements, or right-a-way in the foreseeable future. However, as previously stated, a review of the agricultural land use trends from 2012-2017 showed an average of 12 percent decrease in the number of farms and an approximate 15 percent average decrease in farmland acreage within the nine counties overlapping the basin area (USDA, 2019). Additionally, Houston and Coffee Counties are currently listed in the top 15 fastest growing counties by population in Alabama (USDA, 2018). Although much of the basin is considered as Alabama's prime agricultural land, it may be likely that the current land use and ownership patterns may change to favor developed land over agricultural land.

6.4.2 Preferred Alternative

Alternative 2a: There would be no effect on land use adjacent to the project area, as property ownership and existing use of land would not change. As mentioned earlier, it cannot be guaranteed that this project will influence land use changes. However, Federal support of the existing agricultural production in this basin may incentivize farmers to continue providing a reliable food source needed for the future. Overall, installation of irrigation on existing fields will not result in land use changes.

Alternative 2b: There would be no effect on land use adjacent to the project area, as property ownership and existing use of land would not change. As mentioned earlier, it cannot be guaranteed that this project will influence land use changes. However, Federal support of the existing agricultural production in this basin may incentivize farmers to continue providing a reliable food source needed for the future. Overall, installation of irrigation on existing fields will not result in land use changes.

Alternative 2c: There would be no effect on land use adjacent to the project area, as property ownership and existing use of land would not change. As mentioned earlier, it

cannot be guaranteed that this project will influence land use changes. However, Federal support of the existing agricultural production in this basin may incentivize farmers to continue providing a reliable food source needed for the future. Overall, installation of irrigation on existing fields will not result in land use changes.

6.4.3 Compliance and Best Management Practices

In order to minimize the conversion of agricultural land to developed land, there is a clause within the agreement between the SLO and the applicant requiring the applicant to own or control the land that will be benefiting from this cost-share for at least five years.

6.5 Public Safety

6.5.1 No-Action (Future without Project)

Current conditions are expected to remain relatively constant with no additional impacts in the foreseeable future without the project.

6.5.2 Preferred Alternative

Alternative 2a: May result in temporary safety risks during installation, operation and maintenance of the system due to heavy equipment, high-voltage electricity and use of petroleum products. Any short-term risks to public health and safety could be mitigated. Installing irrigation systems on existing farmland should not result in any permanent change to transportation routes. Expanding irrigation has the potential to create minor delays on local roads during installation. However, these would be brief.

Alternative 2b: May result in temporary safety risks during installation, operation and maintenance of the system due to heavy equipment, high-voltage electricity and use of petroleum products. Any short-term risks to public health and safety could be mitigated. Installing irrigation systems on existing farmland should not result in any permanent change to transportation routes. Expanding irrigation has the potential to create minor delays on local roads during installation. However, these would be brief.

Alternative 2c: May result in temporary safety risks during installation, operation and maintenance of the system due to heavy equipment, high-voltage electricity and use of petroleum products. Any short-term risks to public health and safety could be mitigated. Installing irrigation systems on existing farmland should not result in any permanent change to transportation routes. Expanding irrigation has the potential to create minor delays on local roads during installation. However, these would be brief.

6.5.3 Compliance and Best Management Practices

All local, state and Federal rules concerning worker safety should be observed; measures may include signage, lighting, and access control during and after construction. If a pond is constructed, perimeter fences should be considered to prevent human and animal access, as well as emergency escape facilities to minimize human safety hazards. Adjacent landowners would be provided a construction schedule before construction begins, and ground disturbances would be limited to those areas necessary to safely implement the Preferred Alternative. Installing irrigation systems on existing farmland should not result in any permanent change to transportation routes.

6.6 Socioeconomic Resources

6.6.1 No-Action (Future without Project)

Current conditions are expected to remain relatively constant in the future without the project.

6.6.2 Preferred Alternative

6.6.2.1 Regional Economic Development

Alternative 2a: The Regional Economic Development (RED) will likely experience moderate, positive impacts due to the change in yield of agricultural products at the local level. The estimated annual RED benefit for the Preferred Alternative is $1,389,961.

Alternative 2b: The RED will likely experience moderate, positive impacts due to the change in yield of agricultural products at the local level. The estimated annual RED benefit for the Preferred Alternative is $1,389,961.

Alternative 2c: The RED will likely experience moderate, positive impacts due to the change in yield of agricultural products at the local level. The estimated annual RED benefit for the Preferred Alternative is $1,389,961.

6.6.2.2 National Economic Development Benefits

Alternative 2a: A NED benefit cost analysis has been performed to evaluate the costs and benefits of the Preferred Alternative of increasing on-farm irrigation systems compared to the No Action Alternative (See Appendix D for the Full NED Analysis). The analysis was performed in accordance with NRCS guidelines for evaluating NED benefits as outlined in the NRCS Natural Resources Economics Handbook and the Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies. The NED net benefit (average annual equivalent) of $623,301 is estimated with a benefit cost ratio of 1.17.

Alternative 2b: A NED benefit cost analysis has been performed to evaluate the costs and benefits of the Preferred Alternative of increasing on-farm irrigation systems compared to the No Action Alternative (See Appendix D for the Full NED Analysis). The analysis was performed in accordance with NRCS guidelines for evaluating NED benefits as outlined in the NRCS Natural Resources Economics Handbook and the Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies. The NED net benefit (average annual equivalent) of $623,301 is estimated with a benefit cost ratio of 1.17.

Alternative 2c: A NED benefit cost analysis has been performed to evaluate the costs and benefits of the Preferred Alternative of increasing on-farm irrigation systems compared to the No Action Alternative (See Appendix D for the Full NED Analysis). The analysis was performed in accordance with NRCS guidelines for evaluating NED benefits as outlined in the NRCS Natural Resources Economics Handbook and the Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies. The NED net benefit (average annual equivalent) of $623,301 is estimated with a benefit cost ratio of 1.17.

6.7 Air Quality

6.7.1 No-Action (Future without Project)

No adverse effects are expected to occur under the No Action alternative.

6.7.2 Preferred Alternative

Alternative 2a: Increase of N_2O emissions resulting from the enhanced fertilizer applications which are usually done in conjunction with crop irrigation. Calculations have been done for the average farm size in the Choctawhatchee and Pea watersheds, and for rainfed and irrigated scenarios. Results show that irrigation increases yield which increases soil organic matter, including carbon capture, reducing C by 0.8 CO_2 metric tons equivalent per year. However, increased fertilizer application (NO_2) creates an increase of 4.0 CO_2 metric tons equivalent per year. Given the relatively small areas and slight increase in application rates, models show impacts would be negligible and temporary (see Appendix D, Table D-41).

Alternative 2b: Increase of N_2O emissions resulting from the enhanced fertilizer applications which are usually done in conjunction with crop irrigation. Calculations have been done for the average farm size in the Choctawhatchee and Pea watersheds, and for rainfed and irrigated scenarios. Results show that irrigation increases yield which increases soil organic matter, including carbon capture, reducing C by 0.8 CO_2 metric tons equivalent per year. However, increased fertilizer application (NO_2) creates an increase of 4.0 CO_2 metric tons equivalent per year. Given the relatively small areas

and slight increase in application rates, models show impacts would be negligible and temporary (see Appendix D, Table D-41).

Alternative 2c: Increase of N_2O emissions resulting from the enhanced fertilizer applications which are usually done in conjunction with crop irrigation. Calculations have been done for the average farm size in the Choctawhatchee and Pea watersheds, and for rainfed and irrigated scenarios. Results show that irrigation increases yield which increases soil organic matter, including carbon capture, reducing C by 0.8 CO_2 metric tons equivalent per year. However, increased fertilizer application (NO_2) creates an increase of 4.0 CO_2 metric tons equivalent per year. Given the relatively small areas and slight increase in application rates, models show impacts would be negligible and temporary (see Appendix D, Table D-41).

6.7.3 Compliance and Best Management Practices

If needed, wetting of soil or construction of wind barriers can be implemented as mitigation measures to prevent dust generation from construction activities.

6.8 Water Resources

6.8.1 No-Action (Future without Project)

6.8.1.1 Surface Water Hydrology

Assuming land use in the Choc-Pea Basin remains constant, the No Action alternative is unlikely to have considerable effects on surface water hydrology.

6.8.1.2 Surface Water Quality

Total Nitrogen Loads in Streams

Overall, rainfed fields receive less fertilizer compared to irrigated fields. However, during a drought, plants are unable to fully develop root systems that are needed to take up the applied fertilizer. When the rainfall returns, the residual nitrogen may be carried off the fields by surface runoff or leached into the groundwater during fallow periods. While results vary, studies have shown that increases in plant uptake of nitrogen allow for fewer nitrates to be available in surface runoff or leaching. The conversion of agricultural land into urban land would likely increase surface runoff due to the correlated conversion to impervious surfaces.

Using the SPARROW water quality model, baseline conditions indicate only 7 reaches with TN loads above the EPA guideline. Hurricane Creek has the higher TN load at 10.89 mg/l. With no action, the additional acreage that could be irrigated may be offset by conversion of

agricultural land for development or other land uses. Overall, the No-Action alternative is unlikely to have considerable effects on the current nitrogen loads in streams.

Dissolved Oxygen

Excess nutrient and sediment loads that may run from farmlands contribute to eutrophication resulting in removal of DO through algal respiration, the decomposition of dead algae, and sediment oxygen demand. Low DO levels are harmful to aquatic life. Under the No-Action alternative, the SPARROW model does not predict that excessive nutrients will be added to the streams.

Water Turbidity

Sediment transported in runoff from barren fields (caused by drought) could increase the turbidity of the receiving waters. Increased sediment turbidity impacts primary productivity, degrades stream habitat, and negatively affects some fish and macroinvertebrates. Historical model results under the No-Action alternative indicate that water turbidity is unlikely to be impaired in the future (CPYRWMA.).

Also, no indirect effects or temporary impacts are anticipated for the no federal action alternative.

6.8.1.3 Groundwater Quality and Quantity

Assuming land use in the Choc-Pea Basin remains constant, the No Action alternative is unlikely to have considerable effects on groundwater.

6.8.2 Preferred Alternative

6.8.2.1 Surface Water Hydrology

Alternative 2a: Withdrawal of water from streams for irrigation will lead to reduced flow in streams. It may also affect the statistical frequency of events such as hydrologic droughts and floods. Irrigation withdrawals typically occur during the growing season (spring-summer) and increase during dry or drought conditions. Withdrawals during a drought may exacerbate already low stream flows. This could result in impacts on in-stream and riparian habitats. According to the USGS and OWR assessment, on average 64 percent of irrigation withdrawals in the basin are surface water sources while 36 percent of irrigation withdrawals are from groundwater. Water quantity was analyzed for the entire basin using multiple methods. Extensive modeling at the HUC-8 watershed level was conducted using the Water Supply Stress Index (WaSSI) in conjunction with the DSSAT/GriDSSAT crop model. Tributaries within the basin were analyzed using the SPARROW model for impacts associated with runoff.

The “irrigation density” analysis is used as a proxy to protect in-stream flows in smaller watersheds (HUC-12). Promoting expanded irrigation in HUC-12s that have less than

10 percent of the overall drainage areas irrigated by surface water is recommended to protect local water supplies and existing irrigation investments. The 10 percent scenario is used as a point of reference from the Srivastava (2010) and Handyside (2009) research on irrigation surface water withdrawals and should not be considered as a threshold or limit. Three scenarios were developed to assist with irrigation planning: current irrigated acres, increase in irrigated acres to 10 percent of HUC12 watershed area, and irrigation of all available row crop acres. This scenario is to further ensure that impacts to local water resources are negligible to minor in intensity and allows 168,975 additional irrigated acres in the basin (see Appendix D). Groundwater and aquifers were analyzed using available information from the GSA. In this case, current and projected irrigation demands were compared to documented aquifer recharge.

Current Irrigated Land Scenarios

Assuming an average case scenario where 75 percent and 65 percent of the irrigation demand for the Upper Choctawhatchee and Pea watersheds respectively, came from surface water. If all the current irrigated land in the basin used runoff originating in the basin and at the average demand estimate, it would be 0.30 percent and 0.18 percent of total annual runoff for the Choctawhatchee and Pea watersheds respectively. Current irrigation demand, while not negligible, is very minor in intensity.

10 Percent Irrigated Land Scenarios

Assuming an average case scenario where 75 percent and 65 percent of the irrigation demand for the Upper Choctawhatchee and Pea watersheds respectively, came from surface water. If the 10 percent sensitivity scenario is approximately 192,766 acres (current irrigated plus potential future irrigated agricultural land up to the 10 percent scenario) in the basin and at the average demand estimate, it would be 2.3 percent and 1.9 percent of total annual runoff for the Choctawhatchee and Pea watersheds respectively. The 10 percent scenario irrigation demand would be classified as minor intensity.

All Agricultural Land Scenarios

Assuming an average case scenario where 75 percent and 65 percent of the irrigation demand for the Upper Choctawhatchee and Pea watersheds respectively, came from surface water. If all the agricultural land is irrigated (461,895 acres) in the basin and at the average demand estimate, it would be 6.3 percent and 3.6 percent of total annual runoff for the Choctawhatchee and Pea watersheds respectively. This level of irrigation demand would be classified as minor intensity.

Alternative 2b: Interaction between surface and groundwater is evident especially in the shallow aquifers. Any significant drawdown in groundwater could lead to reduced streamflow. However, the potential for extreme drawdown is mitigated as part of this plan and the risk should be minimal.

Alternative 2c: Same as Alternative 2b.

6.8.2.2 Surface Water Quality

Alternative 2a:

Increased Total Nitrogen Loads in Streams

More fertilizer is applied to irrigated fields when compared to rainfed cases because the stable soil moisture in irrigated fields allows for increased uptake of nutrients by the plants. Minor increases in surface water runoff are expected during irrigation of agricultural lands. The potential exists for some of this increased nitrogen to be carried off the fields directly by surface runoff or leached into the groundwater during fallow periods. While results are varied, some studies show that increases in plant uptake of nitrogen allow fewer nitrates to be available for surface runoff or leaching (see Ellenburg, 2011 for a review).

An increase in irrigated agricultural lands has the potential to increase fertilizer loads. ACES estimated fertilizer rates of 202 kg/ha for rainfed agricultural fields and 280 kg/ha for irrigated fields. The USGS SPARROW model was used to determine the effects of additional fertilizer loads on existing agricultural lands at the reach scale in the study area. Modeling scenarios increase forecasted TN loads on Hurricane Creek, the reach with the highest TN loads in the study area, to 13.11 mg/l for the 10 percent of HUC scenario and to 21.46 mg/l for the irrigation of all agricultural lands' scenario. One reach of the Little Choctawhatchee River exceeds the guideline for the all agricultural lands scenario. The proposed irrigation expansion will be much less than the "all agricultural lands scenarios" and only seasonal minor water quality effects are anticipated.

Water Turbidity

Sediment transported in runoff from barren fields (caused by drought) could increase the turbidity of receiving waters. Increased sediment turbidity impacts primary productivity, degrades stream habitat, and negatively affects some fish and macroinvertebrates. Model results under this alternative show that water turbidity is unlikely to be impaired in the future.

Indirect Effects

This alternative has minimal to moderate potential for indirectly affecting downstream water quality.

Temporary Impacts

Water quality parameters such as turbidity and water clarity could be temporarily impacted due to land disturbing activities associated with the construction of irrigation delivery systems. Impacts would be temporary and of low magnitude. Projects should be evaluated per NRCS-CPA-52 on-farm evaluation to determine if the short-term construction to implement irrigation systems requires mitigation measures.

Alternative 2b: Same as alternative 2a except less withdrawal from surface waters will likely reduce the risk that minimum flows for healthy aquatic life will be affected.

Alternative 2c: Same as alternative 2a except less withdrawal from surface waters will likely reduce the risk that minimum flows for healthy aquatic life will be affected.

6.8.2.3 Groundwater Quality

Alternative 2a:

Groundwater Leaching

Results vary concerning the effects of leaching on groundwater quality, but the majority of studies indicate that leaching is increased under irrigation. Leaching is influenced by field irrigation application methods. Application of irrigation water that exceeds field capacity allows for vertical movement of moisture and nutrients out of the soil column. Soil texture and subsurface conditions, such as depth to the water table, also contribute to groundwater leaching. Irrigation applied in accordance with BMPs reduces the risk of groundwater leaching. In fact, studies have shown (see Ellenburg, 2011 for a review) that when irrigation and fertilization are applied responsibly, plant uptake of nitrogen is increased and less residual nutrients are left in the soil to be leached. This is especially true in the case of corn. Only in the case of over irrigation or excess fertilization is leaching increased. In the present situation, it will be stressed to the recipients that BMP's be followed under irrigation so that leaching will be minimized or even decreased compared to current conditions.

Alternative 2b:

Groundwater Leaching

Results vary concerning the effects of leaching on groundwater quality, but the majority of studies indicate that leaching is increased under irrigation. Leaching is influenced by field irrigation application methods. Application of irrigation water that exceeds field capacity allows for vertical movement of moisture and nutrients out of the soil column. Soil texture and subsurface conditions, such as depth to the water table, also contribute to groundwater leaching. Additionally, groundwater withdrawal could

potentially lower local aquifer levels which could increase concentrations from leaching. Irrigation applied in accordance with BMPs reduces the risk of groundwater leaching. In fact, studies have shown (see Ellenburg, 2011 for a review) that when irrigation and fertilization are applied responsibly, plant uptake of nitrogen is increased and less residual nutrients are left in the soil to be leached. This is especially true in the case of corn. Only in the case of over irrigation or excess fertilization is leaching increased. In the present situation, it will be stressed to the recipients that BMP's be followed under irrigation so that leaching will be minimized or even decreased compared to current conditions.

Alternative 2c:

Groundwater Leaching

Results vary concerning the effects of leaching on groundwater quality, but the majority of studies indicate that leaching is increased under irrigation. Leaching is influenced by field irrigation application methods. Application of irrigation water that exceeds field capacity allows for vertical movement of moisture and nutrients out of the soil column. Soil texture and subsurface conditions, such as depth to the water table, also contribute to groundwater leaching. Additionally, groundwater withdrawal could potentially lower local aquifer levels which could increase concentrations from leaching. Irrigation applied in accordance with BMPs reduces the risk of groundwater leaching. In fact, studies have shown (see Ellenburg, 2011 for a review) that when irrigation and fertilization are applied responsibly, plant uptake of nitrogen is increased and less residual nutrients are left in the soil to be leached. This is especially true in the case of corn. Only in the case of over irrigation or excess fertilization is leaching increased. In the present situation, it will be stressed to the recipients that BMP's be followed under irrigation so that leaching will be minimized or even decreased compared to current conditions.

6.8.2.4 Groundwater Quantity

Alternative 2a: Interaction between surface and groundwater is evident especially in the shallow aquifers. Any significant drawdown in surface water could lead to reduced aquifer levels. Due to the limited expansion of agriculture proposed, quality of the soils in existing agricultural areas and emphasis on using best management practices to prevent over irrigation; the potential for extreme drawdown is mitigated as part of this plan and the risk should be negligible. The greater use of surface water as an irrigation source as opposed to deep wells further limits the potential risk of degraded groundwater quality.

Alternative 2b: The impact of irrigation demand on aquifer levels is analyzed by determining the percentage of recharge that is consumed within the aquifer. Three scenarios are analyzed, each scenario assumes 36 percent of total irrigation demand is groundwater, while 64 percent is surface water. Each scenario is also based on the Maximum, Minimum and Average irrigation demand based on the long-term crop model runs. Recharge data was available for four of the six aquifers analyzed in the basin. The first scenario is current irrigated acreage and the related demand in the aquifer production zone (Appendix Table D-29). The second scenario assumes 10 percent of the total aquifer production zone (Appendix Table D-30) area is irrigated (the 10 percent irrigated land scenario). The third scenario assumes all agricultural land occurring within the aquifer production zone (Appendix Table D-31) is irrigated. Aquifers in this basin overlap one another and it is challenging to estimate from which aquifer a particular withdrawal is occurring. Therefore, it is assumed that all withdrawals over a particular aquifer production zone occur in that aquifer. This is calculated and reported for every aquifer separately. In reality this is not likely but even under these hypothetical scenarios, aquifers experience only negligible to minor impacts.

Current Irrigated Land Scenarios

Current average irrigation demand in the aquifer production zone is less than 1 percent of any aquifer recharge which is considered negligible.

10 Percent Irrigated Land Scenarios

If 10 percent of the aquifer production zone is irrigated, the average irrigation demand for all six aquifers considered productive would remain under ten percent of recharge. This would be classified as a minor impact. Less than 10 percent groundwater recharge indicates that groundwater leaching from changes in nitrogen loads to support expanded irrigation will have minor impacts on groundwater quality. Best practices will be encouraged to further limit any adverse effects on groundwater quality.

All Agricultural Land Scenarios

Assuming all agricultural land in the aquifer production zone were irrigated, the recharge range would be between 13 percent and 15 percent for the six aquifers considered productive. This would be classified as moderate impact. Minor to moderate effects on groundwater quality are anticipated from this scenario depending on soil quality and the extent the irrigation source is wells versus surface water sources. Best practices will be encouraged to further limit any adverse effects on groundwater quality.

Alternative 2c: Same as 2b, except Alternative 2c could potentially be less of an impact when compared to Alternative 2b because the groundwater pumping rate would be significantly lower, thereby reducing drawdown. Reduced groundwater pumping

will also reduce the potential degradation of groundwater quality from nitrogen leaching. Best practices will be encouraged to further limit any adverse effects on groundwater quality.

6.8.3 Compliance and Best Management Practices

The CPA-52 EE will determine if necessary compliance or BMPs should be included. If there are sites selected in sensitive aquifers, the NRCS-AL consultation will consider the site potential and the producer's objectives. If needed, supplemental guidance relating to aquifer areas will be addressed with input from hydrogeologists knowledgeable in the area and working with the NRCS.

6.9 Wetlands and Riparian Areas

6.9.1 No Action (Future without Project)

6.9.1.1 Wetlands

This alternative should not result in any change to the current depth or spatial extent of existing wetlands over the planning horizon.

6.9.1.2 Riparian Areas

This alternative should not result in any change to the current depth or spatial extent of existing riparian areas over the planning horizon.

6.9.2 Preferred Alternative

6.9.2.1 Wetlands

Alternative 2a: The Preferred Alternative is anticipated to have no adverse impacts on wetlands. The groundwater analyses previously described show that the water table in the region will not be adversely impacted so that the depth and extent of wetlands should remain unchanged. The planned spray and drip irrigation (DI) systems will not cause erosion and associated sediment transfer that could fill wetlands and reduce water quality. Expanded irrigation may result in slight increases of runoff and nutrient loads at some sites near existing wetlands. Installation of irrigation systems and related items may temporarily impact wetlands by increasing erosion and runoff from short-term construction activities to access water resources for irrigation. An on-farm evaluation (EE) per NRCS-CPA-52 will be required on a case-by-case basis to determine impacts and any required mitigation measures. Also, NRCS Conservation Measures as defined in the "Alabama NRCS Practice Effects on Threatened and Endangered Species" may

be required to determine if additional mitigation measures are needed (see Appendix E, Table E-1 and Figure E-32).

Alternative 2b: The Preferred Alternative is anticipated to have no adverse impacts on wetlands. The groundwater analyses previously described show that the water table in the region will not be adversely impacted so that the depth and extent of wetlands should remain unchanged. The planned spray and DI systems will not cause erosion and associated sediment transfer that could fill wetlands and reduce water quality. Expanded irrigation may result in slight increases of runoff and nutrient loads at some sites near existing wetlands. Installation of irrigation systems and related items may temporarily impact wetlands by increasing erosion and runoff from short-term construction activities to access water resources for irrigation. An on-farm evaluation (EE) per NRCS-CPA-52 will be required on a case-by-case basis to determine impacts and any required mitigation measures. Also, NRCS Conservation Measures as defined in the "Alabama NRCS Practice Effects on Threatened and Endangered Species" may be required to determine if additional mitigation measures are needed (see Appendix E, Table E-1 and Figure E-32).

Alternative 2c: The Preferred Alternative is anticipated to have no adverse impacts on wetlands. The groundwater analyses previously described show that the water table in the region will not be adversely impacted so that the depth and extent of wetlands should remain unchanged. The planned spray and DI systems will not cause erosion and associated sediment transfer that could fill wetlands and reduce water quality. Expanded irrigation may result in slight increases of runoff and nutrient loads at some sites near existing wetlands. Installation of irrigation systems and related items may temporarily impact wetlands by increasing erosion and runoff from short-term construction activities to access water resources for irrigation. An on-farm evaluation (EE) per NRCS-CPA-52 will be required on a case-by-case basis to determine impacts and any required mitigation measures. Also, NRCS Conservation Measures as defined in the "Alabama NRCS Practice Effects on Threatened and Endangered Species" may be required to determine if additional mitigation measures are needed (see Appendix E, Table E-1 and Figure E-32).

6.9.2.2 Riparian Areas

Alternative 2a: Based on the minor changes to water quantity, existing riparian areas are likely to experience negligible to minor impacts from this alternative. Sites identified for implementation will also undergo onsite evaluations as outlined in the Environmental Evaluation Worksheet (NRCS-CPA-52) to identify any potential localized risk to riparian zones and water supplies.

Alternative 2b: Based on the negligible changes to surface water quantity, existing riparian areas are likely to experience negligible impacts from this alternative. Sites identified for implementation will also undergo onsite evaluations as outlined in the

Environmental Evaluation Worksheet (NRCS-CPA-52) to identify any potential localized risk to riparian zones and water supplies.

Alternative 2c: Based on the negligible changes to water quantity, existing riparian areas are likely to experience negligible impacts from this alternative. Sites identified for implementation will also undergo onsite evaluations as outlined in the Environmental Evaluation Worksheet (NRCS-CPA-52) to identify any potential localized risk to riparian zones and water supplies.

6.9.3 Compliance and Best Management Practices

The CPA-52 EE will determine if necessary compliance or BMPs should be included. Conservation planning in riparian areas requires special considerations. A resource problem within the riparian area may be the manifestation of upland management decisions. If there are sites selected near riparian areas, the NRCS-AL consultation will consider soils, the present plant community, the site potential, geomorphology of both stream and the watershed, hydrologic regime, fish and wildlife needs, the management of the upland areas of the watershed, and the producer's objectives. Potential mitigation strategies include increasing buffer distance as needed to maintain the ecological and structural integrity of the riparian buffer and stream bank, and not crossing streams when using an irrigation water conveyance practice.

6.10 T&E and MBTA/BGEPA Species

6.10.1 No-Action (Future without Project)

6.10.1.1 T&E Species

Assuming land use in the Choc-Pea Basin remains constant, conditions affecting T&E species are estimated to remain the same.

6.10.1.2 MBTA/BGEPA Species

Assuming land use in the Choc-Pea Basin remains constant, conditions affecting MBTA/BGEPA species are estimated to remain the same.

6.10.2 Preferred Alternative

6.10.2.1 Threatened and Endangered Species

Alternative 2a: Development and disturbance in watersheds can directly or indirectly impact habitats used by T&E species. Changes in habitat conditions may be ephemeral and present short-term risk to T&E populations, or they may be permanent and significantly alter the watershed's ability to support T&E species. Threatened and

endangered species may be especially sensitive to changes in watershed conditions. The extent of potential impacts on T&E species is difficult to evaluate until specific project sites have been identified by the NRCS and the SLO. Measures have been and will continue to be taken to prevent negative impact on T&E populations. The SHU data will help inform NRCS personnel during specific project site evaluations of possible conflict or intersection. Any effects can be minimized through mitigation efforts. Each of the project-approved practices results in a "no effect", "mitigating action", and/or specific "on-farm consult". Based on this tiered approach, the anticipated effects are expected to be negligible to minor.

Alternative 2b: Development and disturbance in watersheds can directly or indirectly impact habitats used by T& E species. Changes in habitat conditions may be ephemeral and present short-term risk to T&E populations, or they may be permanent and significantly alter the watershed's ability to support T&E species. Threatened and endangered species may be especially sensitive to changes in watershed conditions. The extent of potential impacts on T&E species is difficult to evaluate until specific project sites have been identified by the NRCS and the SLO. Measures have been and will continue to be taken to prevent negative impact on T&E populations. The SHU data will help inform NRCS personnel during specific project site evaluations of possible conflict or intersection. Any effects can be minimized through mitigation efforts. Each of the project-approved practices results in a "no effect", "mitigating action", and/or specific "on-farm consult". Based on this tiered approach, the anticipated effects are expected to be negligible to minor.

Alternative 2c: Development and disturbance in watersheds can directly or indirectly impact habitats used by T& E species. Changes in habitat conditions may be ephemeral and present short-term risk to T&E populations, or they may be permanent and significantly alter the watershed's ability to support T&E species. Threatened and endangered species may be especially sensitive to changes in watershed conditions. The extent of potential impacts on T&E species is difficult to evaluate until specific project sites have been identified by the NRCS and the SLO. Measures have been and will continue to be taken to prevent negative impact on T&E populations. The SHU data will help inform NRCS personnel during specific project site evaluations of possible conflict or intersection. Any effects can be minimized through mitigation efforts. Each of the project-approved practices results in a "no effect", "mitigating action", and/or specific "on-farm consult". Based on this tiered approach, the anticipated effects are expected to be negligible to minor.

6.10.2.2 MBTA/BGEPA Species

Alternative 2a: Construction and operation of project components are not likely to affect migratory birds or eagles. Wintering or migrating birds would experience negligible impacts from construction disturbance because they have the flexibility to move away from disturbances to other suitable areas.

Alternative 2b: Construction and operation of project components are not likely to affect migratory birds or eagles. Wintering or migrating birds would experience negligible impacts from construction disturbance because they have the flexibility to move away from disturbances to other suitable areas.

Alternative 2c: This alternative would have no effect on excavated water storage ponds in the project area, which would provide summer drinking water and habitat for wildlife. Construction and operation of project components are not likely to affect migratory birds or eagles. Wintering or migrating birds would experience negligible impacts from construction disturbance because they have the flexibility to move away from disturbances to other suitable areas.

6.10.3 Compliance and Best Management Practices

6.10.3.1 T&E Species

The project area overlaps with designated Critical Habitat for one fish and five freshwater clam species, as described in Section 6.2. Per the ESA, organizations are required to consult with the USFWS if listed species or designated Critical Habitat may be affected by a proposed project. There are defined procedures for listing species, designating critical habitat for listed species, and preparing recovery plans, if necessary. The ESA requires federal agencies to evaluate the likely effects of the proposed project and ensure that it neither risk the continued existence of federally listed ESA species, nor results in the destruction or adverse modification of designated Critical Habitat.

All requirements of the Alabama USFWS-NRCS Informal ESA Consultation for federally listed species will be followed (excerpts are included in Appendix E – Table E.1. and Figure E-32.). Endangered Species Act Section 7(a) consultation will occur, if necessary, to develop or negotiate reasonable and prudent measures to mitigate potential negative impacts, including cumulative effects. Mitigation strategies may include: not altering hydrology of ephemeral drains, increasing buffer distance as needed to maintain the ecological and structural integrity of the riparian buffer and stream bank, and not crossing streams when using an irrigation water conveyance practice.

6.10.3.2 MBTA/BGEPA

MBTA, BGEPA, and E.O. 13186 require NRCS-AL to consider the impacts of planned actions on migratory bird and eagle populations and habitats for all planning activities. This may require cooperation with the US Fish and Wildlife Service if the action will result in a measurable negative effect on migratory bird populations. The SLO and NRCS will be working with USFWS to ensure minimal disturbance to any bald or golden eagles nesting near the project area. A site visit with a USFWS biologist will be conducted if deemed necessary to assess potential habitat disturbance. The NRCS would continue to work with USFWS to ensure that appropriate buffers are maintained between project construction activities and active nests or that construction in areas with known nests is avoided during the

critical nesting period. The critical nesting period for bald and golden eagles is January 1 through August 31.

6.11 Cumulative Effects

6.11.1 Cumulative Effects by Resource

Table 6-2 below depicts the potential impacts on the resources of concern estimated for each of the alternatives presented. Within this table, the duration of effects is also estimated. These durations were estimated using the following reasoning:

- Seasonal: Effects which occur during a certain season or time of year
- Temporary: Transitory effects which only occur over a period of days or months
- Short-term: Effects lasting between 1 to 5 years.
- Long-term: Effects lasting more than 5 years.

The scenarios represent each of the Alternatives including the FWOP Alternative and the three subparts offered under the SIE Alternatives. These subparts are as follows:

- Alternative 2a: New expansion of irrigation application practices
- Alternative 2b: Same as Alternative 2a + creation of a well larger than 4”
- Alternative 2c: Same as Alternative 2a + creation of an irrigation reservoir + 4” well

Table 6-3 summarizes the compliance and BMPs for both the FWOP (No-Action) and SIE Alternatives.

Table 6-2. Potential Impacts on the Resources of Concern Estimated for Each of the Alternatives

RESOURCE CONCERN	SCENARIO	ESTIMATED IMPACT THRESHOLD	ESTIMATED DURATION OF EFFECTS	RATIONALE
Cultural Resources	Existing Conditions	Negligible – Major	Long-term; Seasonal	The project area overlaps with hundreds of known historic resources and thousands of archaeological sites. Watershed conditions that cause measurable change, whether short- or long-term, to cultural resources may currently exist. The true current effects are unknown at this scale
	FWOP (No-Action)	Negligible – Major	Long-term; Seasonal	Assuming land use in the Choc-Pea Basin remains constant, affects to any archaeological resources located in rainfed fields are expected to be negligible to major; whereas affects to non-archaeological historic resources are expected to be negligible.
	Alternative 2a	Negligible – Minor	Long-term	The extent of potential impacts on cultural resources is difficult to evaluate until specific project sites have been identified by the NRCS and the SLO. Any adverse effects can be effectively mitigated.
	Alternative 2b	Negligible – Minor	Long-term	The extent of potential impacts on cultural resources is difficult to evaluate until specific project sites have been identified by the NRCS and the SLO. Any adverse effects can be effectively mitigated.
	Alternative 2c	Negligible – Minor	Long-term	The extent of potential impacts on cultural resources is difficult to evaluate until specific project sites have been identified by the NRCS and the SLO. Any adverse effects can be effectively mitigated.

Table 6-2. Potential Impacts on the Resources of Concern Estimated for Each of the Alternatives

RESOURCE CONCERN	SCENARIO	ESTIMATED IMPACT THRESHOLD	ESTIMATED DURATION OF EFFECTS	RATIONALE
Fish and Aquatic Resources	Existing Conditions	Negligible-Moderate	Long-term; Seasonal	The project area overlaps designated Critical Habitat for one fish and five freshwater clam federally listed species. Watershed conditions that cause measurable change, whether short- or long-term, to fish and aquatic populations and habitats may currently exist. The true current effects are unknown at this scale.
	FWOP (No-Action)	Negligible	Long-term; Seasonal	Assuming land use remains constant, impacts to fish and aquatic species beyond existing conditions are expected to be negligible.
	Alternative 2a	Negligible-Minor	Long-term; Seasonal	The extent of potential impacts on fish and aquatic resources is difficult to evaluate until specific project sites have been identified by the NRCS and the SLO. Any adverse effects can be effectively mitigated.
	Alternative 2b	Negligible-Minor	Long-term; Seasonal	The extent of potential impacts on fish and aquatic resources is difficult to evaluate until specific project sites have been identified by the NRCS and the SLO. Any adverse effects can be effectively mitigated.
	Alternative 2c	Negligible-Minor	Long-term; Seasonal	The extent of potential impacts on fish and aquatic resources is difficult to evaluate until specific project sites have been identified by the NRCS and the SLO. Any adverse effects can be effectively mitigated.
Geology and Soils	Existing Conditions	Minor	Long-term; Seasonal	Under rainfed farming, erosion from fields may occur during drought periods; eventual rainfall creates excessive runoff and erosion.

Table 6-2. Potential Impacts on the Resources of Concern Estimated for Each of the Alternatives

RESOURCE CONCERN	SCENARIO	ESTIMATED IMPACT THRESHOLD	ESTIMATED DURATION OF EFFECTS	RATIONALE
	FWOP (No-Action)	Minor	Long-term; Seasonal	Under rainfed farming, erosion from fields may occur during drought periods; eventual rainfall creates excessive runoff and erosion.
	Alternative 2a	Minor	Short-term; Temporary	May result in increased runoff that could also carry sediment, but effects would be short-term and localized.
	Alternative 2b	Minor	Short-term; Temporary	May result in increased runoff that could also carry sediment, but effects would be short-term and localized.
	Alternative 2c	Minor	Short-term; Temporary	May result in increased runoff that could also carry sediment, but effects would be short-term and localized.
Land Use	Existing Conditions	Negligible-Moderate	Short-term; Long-term	Depending on current agricultural locations, the following may occur: existing land uses or ownership would continue as before; short-term change or interruption to land use or access to existing land uses; or land use changes that are inconsistent with existing ownership, easements, or right-of-way.
	FWOP (No-Action)	Negligible	N/A	Land use changes are expected to remain consistent with existing ownership, easements, or right-a-way in the foreseeable future. However, current land use and ownership patterns may change to favor developed land over agricultural land.
	Alternative 2a	Negligible	N/A	There would be no effect on land use adjacent to the project area, as property ownership and existing use of land would not change. However, Federal support of

Table 6-2. Potential Impacts on the Resources of Concern Estimated for Each of the Alternatives

RESOURCE CONCERN	SCENARIO	ESTIMATED IMPACT THRESHOLD	ESTIMATED DURATION OF EFFECTS	RATIONALE
				the existing agricultural production in this basin may incentivize farmers to continue providing a reliable food source needed for the future.
	Alternative 2b	Negligible	N/A	There would be no effect on land use adjacent to the project area, as property ownership and existing use of land would not change. However, Federal support of the existing agricultural production in this basin may incentivize farmers to continue providing a reliable food source needed for the future.
	Alternative 2c	Negligible	N/A	There would be no effect on land use adjacent to the project area, as property ownership and existing use of land would not change. However, Federal support of the existing agricultural production in this basin may incentivize farmers to continue providing a reliable food source needed for the future.
Public Safety	Existing Conditions	Negligible	N/A	No change in risk to human health and safety.
	FWOP (No-Action)	Negligible	N/A	Current conditions are expected to remain relatively constant with no additional impacts in the foreseeable future without the project.
	Alternative 2a	Negligible	Short-term; Temporary	May result in temporary safety risks during installation, operation and maintenance of the system due to heavy equipment, high-voltage electricity and use of petroleum products. Any short-term risks to public health and safety could be mitigated.

Table 6-2. Potential Impacts on the Resources of Concern Estimated for Each of the Alternatives

RESOURCE CONCERN	SCENARIO	ESTIMATED IMPACT THRESHOLD	ESTIMATED DURATION OF EFFECTS	RATIONALE
	Alternative 2b	Negligible	Short-term; Temporary	May result in temporary safety risks during installation, operation and maintenance of the system due to heavy equipment, high-voltage electricity and use of petroleum products. Any short-term risks to public health and safety could be mitigated.
	Alternative 2c	Negligible	Short-term; Temporary	May result in temporary safety risks during installation, operation and maintenance of the system due to heavy equipment, high-voltage electricity and use of petroleum products. Any short-term risks to public health and safety could be mitigated.
Socioeconomics	Existing Conditions	Negligible-Minor	Short-term; Temporary	No effect, or in times of drought, little effect on the yield of agricultural products due to lack of water availability. Temporary changes to income and/or local employment levels.
	FWOP (No-Action)	Negligible	N/A	Current conditions are expected to remain relatively constant in the future without the project.
	Alternative 2a	Moderate	Long-term	Moderate, positive impacts are expected due to the change in yield of agricultural products at the local level.
	Alternative 2b	Moderate	Long-term	Moderate, positive impacts are expected due to the change in yield of agricultural products at the local level.

Table 6-2. Potential Impacts on the Resources of Concern Estimated for Each of the Alternatives

RESOURCE CONCERN	SCENARIO	ESTIMATED IMPACT THRESHOLD	ESTIMATED DURATION OF EFFECTS	RATIONALE
	Alternative 2c	Moderate	Long-term	Moderate, positive impacts are expected due to the change in yield of agricultural products at the local level.
Air Quality	Existing Conditions	Negligible-Moderate	Long-term	The project area is in the 80-90th national percentile for NATA Air Toxics Cancer Risk, 50-60th for NATA Respiratory Hazard Index, and 57th for Particulate Matter in the air.
	FWOP (No-Action)	Negligible	N/A	No adverse effects are expected to occur.
	Alternative 2a	Negligible	Temporary	Dust could be generated during construction. Increased fertilizer application results in increased CO_2, but models show impacts would be minimal given the relatively small areas and slight increase in application rates.
	Alternative 2b	Negligible	Temporary	Dust could be generated during construction. Increased fertilizer application results in increased CO_2, but models show impacts would be minimal given the relatively small areas and slight increase in application rates.
	Alternative 2c	Negligible	Temporary	Dust could be generated during construction. Increased fertilizer application results in increased CO_2, but models show impacts would be minimal given the relatively small areas and slight increase in application rates.
	Existing Conditions	Negligible-Minor	Long-term	Current conditions indicate a small number of streams have TN levels above EPA recommended levels.

Table 6-2. Potential Impacts on the Resources of Concern Estimated for Each of the Alternatives

RESOURCE CONCERN	SCENARIO	ESTIMATED IMPACT THRESHOLD	ESTIMATED DURATION OF EFFECTS	RATIONALE
Water Resources – Surface Water Quality	FWOP (No-Action)	Negligible	N/A	Assuming land use remains constant, adverse effects on water resources are not expected.
	Alternative 2a	Negligible-Minor	Temporary; Seasonal	Streams may experience seasonal higher nitrogen loads if the project sites are in near proximity to streams. Increased sediment loads, both from irrigation operations and during precipitation events, are also likely to temporarily increase. However, the overwhelming majority of reaches do not exceed the EPA guideline of 2-6 mg/L (EPA, 2013).
	Alternative 2b	Negligible-Minor	Temporary; Seasonal	Streams may experience seasonal higher nitrogen loads if the project sites are in near proximity to streams. Increased sediment loads, both from irrigation operations and during precipitation events, are also likely to temporarily increase. However, the overwhelming majority of reaches do not exceed the EPA guideline of 2-6 mg/L (EPA, 2013).
	Alternative 2c	Negligible-Minor	Temporary; Seasonal	Streams may experience seasonal higher nitrogen loads if the project sites are in near proximity to streams. Increased sediment loads, both from irrigation operations and during precipitation events, are also likely to temporarily increase. However, the overwhelming majority of reaches do not exceed the EPA guideline of 2-6mg/L (EPA, 2013).
	Existing Conditions	Minor	Long-term	On average 64 percent of irrigation withdrawals in the basin are surface water sources.

Table 6-2. Potential Impacts on the Resources of Concern Estimated for Each of the Alternatives

RESOURCE CONCERN	SCENARIO	ESTIMATED IMPACT THRESHOLD	ESTIMATED DURATION OF EFFECTS	RATIONALE
Water Resources – Surface Water Quantity	FWOP (No-Action)	Negligible - Minor	N/A	Assuming land use in the Choc-Pea Basin remains constant, the No Action alternative is unlikely to have considerable effects on surface water quantity.
	Alternative 2a	Negligible - Minor	Temporary; Seasonal	Promoting expanded irrigation in HUC-12s that have less than 10 percent of the overall drainage areas irrigated is recommended to protect local water supplies and existing irrigation investments. This is to further ensure impacts to local water resources are negligible to minor in intensity but would still allow 168,975 additional irrigated acres in the basin
	Alternative 2b	Negligible - Minor	Temporary; Seasonal	Promoting expanded irrigation in HUC-12s that have less than 10 percent of the overall drainage areas irrigated is recommended to protect local water supplies and existing irrigation investments. This is to further ensure impacts to local water resources are negligible to minor in intensity but would still allow 168,975 additional irrigated acres in the basin
	Alternative 2c	Negligible - Minor	Temporary; Seasonal	Promoting expanded irrigation in HUC-12s that have less than 10 percent of the overall drainage areas irrigated is recommended to protect local water supplies and existing irrigation investments. This is to further ensure impacts to local water resources are negligible to minor in intensity but would still allow 168,975 additional irrigated acres in the basin
Water Resources – Ground Water Quality	Existing Conditions	Negligible - Minor	Temporary; Seasonal	Water quality is not an impediment to development of water supplies from the major aquifers in southeast Alabama with the exception of naturally occurring saline water, expressed in concentrations of chloride, which is depth dependent.

Table 6-2. Potential Impacts on the Resources of Concern Estimated for Each of the Alternatives

RESOURCE CONCERN	SCENARIO	ESTIMATED IMPACT THRESHOLD	ESTIMATED DURATION OF EFFECTS	RATIONALE
Water Resources – Ground Water Quantity	FWOP (No-Action)	Negligible	N/A	Assuming land use in the Choc-Pea Basin remains constant, the No Action alternative is unlikely to have considerable effects on groundwater.
	Alternative 2a	Negligible - Minor	Temporary; Seasonal	Irrigation may increase groundwater leaching in the case of over-irrigation or excess fertilization. However, irrigation applied in accordance with BMPs reduces the risk of groundwater leaching.
	Alternative 2b	Negligible - Minor	Temporary; Seasonal	Irrigation may increase groundwater leaching in the case of over-irrigation or excess fertilization. However, irrigation applied in accordance with BMPs reduces the risk of groundwater leaching.
	Alternative 2c	Negligible - Minor	Temporary; Seasonal	Irrigation may increase groundwater leaching in the case of over-irrigation or excess fertilization. However, irrigation applied in accordance with BMPs reduces the risk of groundwater leaching.
	Existing Conditions	Negligible	Long-term	Any aquifer stress in this region is generally located near population centers where municipalities use high-capacity wells within close proximity; however, while these areas have relatively higher demand, no identifiable levels of unacceptable stress exist.
	FWOP (No-Action)	Negligible	N/A	Assuming land use in the Choc-Pea Basin remains constant, the No Action alternative is unlikely to have considerable effects on groundwater.

Table 6-2. Potential Impacts on the Resources of Concern Estimated for Each of the Alternatives

RESOURCE CONCERN	SCENARIO	ESTIMATED IMPACT THRESHOLD	ESTIMATED DURATION OF EFFECTS	RATIONALE
Wetlands and Riparian Areas	Alternative 2a	Negligible - Minor	Temporary; Seasonal	Due to the limited expansion of agriculture proposed, quality of the soils in existing agricultural areas and emphasis on using best management practices to prevent over irrigation, the potential for extreme drawdown is mitigated as part of this plan and the risk should be negligible.
	Alternative 2b	Negligible - Moderate	Temporary; Seasonal	Depending on the irrigation demand attributed to each scenario, the impacts range from negligible to moderate.
	Alternative 2c	Negligible-Minor	Temporary; Seasonal	Drawdown is significantly reduced with this alternative due to the lower pumping rate, which in turn reduces the impact.
	Existing Conditions	Negligible-Minor	Long-term; Seasonal	Current altered hydraulic function or hydraulic capacity of wetlands and riparian areas are to a degree that does not increase or decrease the potential for flooding and damage to personal property.
	FWOP (No-Action)	Negligible	N/A	This alternative should not result in any change to the current depth or spatial extent of existing wetlands or riparian areas.
	Alternative 2a	Negligible-Minor	Short-term; Temporary	There may be slight increases of runoff and nutrient loads at some sites near existing wetlands or riparian areas. Locations will be evaluated to determine impacts and any required mitigation measures will be implemented.

Table 6-2. Potential Impacts on the Resources of Concern Estimated for Each of the Alternatives

RESOURCE CONCERN	SCENARIO	ESTIMATED IMPACT THRESHOLD	ESTIMATED DURATION OF EFFECTS	RATIONALE
	Alternative 2b	Negligible-Minor	Short-term; Temporary	There may be slight increases of runoff and nutrient loads at some sites near existing wetlands or riparian areas. Locations will be evaluated to determine impacts and any required mitigation measures will be implemented.
	Alternative 2c	Negligible-Minor	Short-term; Temporary	There may be slight increases of runoff and nutrient loads at some sites near existing wetlands or riparian areas. Locations will be evaluated to determine impacts and any required mitigation measures will be implemented.
T&E and MBTA/BGEPA Species	Existing Conditions	Negligible-Minor	Long-term; Seasonal	There are approximately twelve T&E species within the project area including three species of plants, one species of fish, one species of reptiles, two species of birds, and five species of clams. Long-term changes in wildlife populations or habitats would not be measurable. Any adverse effects can be effectively mitigated.
	FWOP (No-Action)	Negligible-Minor	Long-term; Seasonal	Assuming land use remains constant, conditions affecting T&E and MBTA/BGEPA species are estimated to remain the same.
	Alternative 2a	Negligible-Minor	Long-term; Seasonal	The extent of potential impacts on T&E and MBTA/BGEPA species is difficult to evaluate until specific project sites have been identified by the NRCS and the SLO. Any adverse effects can be effectively mitigated.
	Alternative 2b	Negligible-Minor	Long-term; Seasonal	The extent of potential impacts on T&E and MBTA/BGEPA species is difficult to evaluate until specific project sites have been identified by the NRCS and the SLO. Any adverse effects can be effectively mitigated.

Table 6-2. Potential Impacts on the Resources of Concern Estimated for Each of the Alternatives

RESOURCE CONCERN	SCENARIO	ESTIMATED IMPACT THRESHOLD	ESTIMATED DURATION OF EFFECTS	RATIONALE
	Alternative 2c	Negligible-Minor	Long-term; Seasonal	The extent of potential impacts on T&E and MBTA/BGEPA species is difficult to evaluate until specific project sites have been identified by the NRCS and the SLO. Any adverse effects can be effectively mitigated.

Table 6-3. Summary of Compliance and BMPs for the Alternatives

RESOURCE CONCERN	SCENARIO	COMPLIANCE AND BEST MANAGEMENT PRACTICES
Cultural Resources	FWOP (No-Action)	Since current conditions will remain relatively constant with no additional impacts, compliance and BMPs are not included for this alternative.
	Alternative 2: SIE	In accordance with the SPPA between the AL-NRCS and the AHC (see AL-NRCS, 2017) and policy (see Title 190, NCRH, Subpart C Section 601.29), an Inadvertent Discovery Plan would be followed if any cultural materials, including human remains, were encountered during construction. Construction would stop accordingly, SHPO and AL-NRCS cultural resources staff would be consulted, and appropriate Tribes would be notified. Continuation of construction would occur in accordance with applicable guidance and law.
Fish and Aquatic Resources	FWOP (No-Action)	Since current conditions will remain relatively constant with no additional impacts, compliance and BMPs are not included for this alternative.

Table 6-3. Summary of Compliance and BMPs for the Alternatives

RESOURCE CONCERN	SCENARIO	COMPLIANCE AND BEST MANAGEMENT PRACTICES
	Alternative 2: SIE	NRCS must first assess whether a proposed action or alternative will result in short or long-term disruptions or alterations that may result in an "adverse effect" to EFH. If yes, NRCS may first consider if and how the action or alternative can be modified to mitigate potential adverse effects. If that is not possible, NRCS will have to consult with NMFS to determine measures to conserve such habitat. Following consultation, NRCS is responsible for detailing the measures that will be taken to mitigate any adverse effects to EFH and explain reasons for any actions inconsistent with the NMFS EFH recommendations.
Geology and Soils	FWOP (No-Action)	Since current conditions will remain relatively constant with no additional impacts, compliance and BMPs are not included for this alternative.
	Alternative 2: SIE	Appropriate erosion control measures would be used. To minimize soil erosion, create positive SOC and N budgets, enhance activity and species diversity of soil biota (micro, meso, and macro), and improve structural stability. Site-specific techniques of restoring soil quality could include conservation agriculture, integrated nutrient management, continuous vegetative cover such as residue mulch and cover cropping
Land Use	FWOP (No-Action)	Since current conditions will remain relatively constant with no additional impacts, compliance and BMPs are not included for this alternative.
	Alternative 2: SIE	In order to minimize the conversion of agricultural land to developed land, there is a clause within the agreement between the SLO and the applicant requiring the applicant to own or control the land that will benefit from this cost-share for at least five years.
Public Safety	FWOP (No-Action)	Since current conditions will remain relatively constant with no additional impacts, compliance and BMPs are not included for this alternative.
	Alternative 2: SIE	All local, state and Federal rules concerning worker safety should be observed; measures may include signage, lighting, and access control during and after construction. If a pond is constructed, perimeter fences should be considered to prevent human and animal access, as well as emergency escape facilities to

Table 6-3. Summary of Compliance and BMPs for the Alternatives

RESOURCE CONCERN	SCENARIO	COMPLIANCE AND BEST MANAGEMENT PRACTICES
		minimize human safety hazards. Adjacent landowners would be provided a construction schedule before construction begins, and ground disturbances would be limited to those areas necessary to safely implement the Preferred Alternative. Installing irrigation systems on existing farmland should not result in any permanent change to transportation routes.
Socioeconomics	FWOP (No-Action)	Since current conditions will remain relatively constant with no additional impacts, compliance and BMPs are not included for this alternative.
	Alternative 2: SIE	Adjacent landowners would be provided a construction schedule before construction begins. All local, state and Federal rules concerning worker safety should be observed. Measures may include signage, lighting, and access control during and after construction.
Air Quality	FWOP (No-Action)	Since current conditions will remain relatively constant with no additional impacts, compliance and BMPs are not included for this alternative.
	Alternative 2: SIE	If needed, wetting of soil or construction of wind barriers can be implemented as mitigation measures to prevent dust generation from construction activities.
Water Resources	FWOP (No-Action)	Since current conditions will remain relatively constant with no additional impacts, compliance and BMPs are not included for this alternative.
	Alternative 2: SIE	Irrigation water losses include air losses, canopy losses, soil and water surface evaporation, runoff, and deep percolation. The magnitude of each loss is dependent on the design and operation of each type of irrigation system. To prevent degradation to surface and groundwater resources through erosion and chemical runoff, BMPs can be implemented to reduce erosion. Proper soil testing can prevent overuse of fertilizers.
Wetlands and Riparian Areas	FWOP (No-Action)	Since current conditions will remain relatively constant with no additional impacts, compliance and BMPs are not included for this alternative.

Table 6-3. Summary of Compliance and BMPs for the Alternatives

RESOURCE CONCERN	SCENARIO	COMPLIANCE AND BEST MANAGEMENT PRACTICES
	Alternative 2: SIE	The CPA-52 EE will determine if necessary compliance or BMPs should be included. Conservation planning in riparian areas requires special considerations. A resource problem within the riparian area may be the manifestation of upland management decisions. If there are sites selected near riparian areas, the NRCS-AL consultation will consider soils, the present plant community, the site potential, geomorphology of both stream and the watershed, hydrologic regime, fish and wildlife needs, the management of the upland areas of the watershed, and the producer's objectives. Potential mitigation strategies include increasing buffer distance as needed to maintain the ecological and structural integrity of the riparian buffer and stream bank, and not crossing streams when using an irrigation water conveyance practice.
T&E and MBTA/BGEPA Species	FWOP (No-Action)	Since current conditions will remain relatively constant with no additional impacts, compliance and BMPs are not included for this alternative.
	Alternative 2: SIE	All requirements of the USFWS-NRCS Informal ESA Consultation for federally listed species will be followed. Endangered Species Act Section 7(a) consultation will occur, if necessary, to develop or negotiate reasonable and prudent measures to mitigate potential negative impacts to T&E species. If it is determined that potential impacts exist at a specific project site, potential mitigation efforts will include operating construction outside the nesting period for MBTA/BGEPA species.

7. Consultation, Coordination, and Public Participation

NEPA requires NRCS, where NRCS has control or responsibility over the action, to analyze the environmental impacts of such actions and make the analysis available to the public before decisions are made and actions are taken unless the action is categorically excluded. The analysis and finding begins by conducting an environmental evaluation to determine whether an EA and finding of no significant impact (FONSI), an EIS and record of decision (ROD), or a categorical exclusion is the appropriate form of documentation. NRCS regulations for complying with NEPA may be found in 7 CFR Section 650.

7.1 Consultation

Table 7-1 lists the resource concerns or regulation and the appropriate consulting entity that may require consultation:

Table 7-1. Consulting Entities per Resource Concern

Resource Concern / Regulation	Consulting Entity
Air Quality	EPA Office of Air and Radiation
Water Quality	ADEM/EPA Office of Water
Cultural Resources (Historic Properties)	SHPO/THPO/Federally recognized Tribe
Coastal Zones	State Coastal Zone Program Office
Endangered and Threatened Species	USFWS/National Marine Fisheries Service (NMFS)
Essential Fish Habitat	NMFS
Tribal Interests	Affected Tribal Government
Waters of the United States, Including Wetlands	U.S. Army Corps of Engineers (USACE)
Wild and Scenic Rivers	U.S. National Park Service (NPS)

Consultations are tied to the Federal action and are the responsibility of the lead Federal agency (NRCS-AL) regardless of partners, cooperating entities, or the sponsors involved. NRCS may delegate consultations to third-party contractors or other entities (except for historic property consultation), but NRCS remains the responsible party for conducting the consultation.

7.2 List of Persons and Agencies Consulted

Table 7-2 lists agencies and tribal communities that were contacted and invited to be cooperating agencies for the EA process and determine if there were new circumstances or information relevant to the environmental concerns and bearing on the proposed actions or its impacts. In accordance with the NRCS guidelines, each group was formally invited to participate.

Table 7-2. List of Consulting Entities for the Choc-Pea Basin

Type of Entity	Consulting Entities
Tribal Authorities	Absentee-Shawnee Tribe of Oklahoma
	Alabama-Coushatta Tribe of Texas
	Alabama-Quassarte Tribal Town
	Cherokee Nation
	Chickasaw Nation
	Choctaw Nation of Oklahoma
	Coushatta Tribe of Louisiana
	Eastern Band of Cherokee Indians
	Eastern Shawnee Tribe of Oklahoma
	Jena Band of Choctaw Indians
	Kialegee Tribal Town
	Miccosukee Tribe of Indians of Florida
	Mississippi Band of Choctaw Indians
	Muscogee (Creek) Nation of Oklahoma
	Poarch Band of Creek Indians
	Seminole Nation of Oklahoma
	Seminole Nation of Florida
	Shawnee Tribe
	Thlopthlocco Tribal Town
	United Keetoowah Band of Cherokee Indians

Table 7-2. List of Consulting Entities for the Choc-Pea Basin

Type of Entity	Consulting Entities
Governmental Agencies	U.S. Fish and Wildlife Service
	Geological Survey of Alabama
	Alabama Department of Economic and Community Affairs
	U.S. Geological Survey
	Alabama Department of Environmental Management
	Alabama Department of Conservation and Natural Resources
	Alabama Historical Commission
	Alabama Department of Agriculture & Industries
	Alabama Soil and Water Conservation Committee: Conservation Districts
	U.S. Army Corps of Engineers
	City of Dothan
	Choctawhatchee, Yellow, and Pea Rivers Watershed Management Authority
Non-Governmental Organizations	Alabama Rivers Alliance
	The Nature Conservancy
	Alfa Farmers Federation
	Troy Cable
	Manufacture Alabama
	Alabama Rural Water Association
	Choctawhatchee Riverkeeper

7.3 Review of the Draft Plan-EA

8. Preferred Alternative

8.1 Selection of the Preferred Alternative

The project sponsors selected the SIE Alternative as the Preferred Alternative, based on its ability to meet the purpose and need for the project and provide the most beneficial effects on environmental and social resources. The Preferred Alternative is the only alternative that meets the SLO purpose and needs and meets the National Economic Development (NED) Plan benefit-cost ratio.

8.2 Rationale for the Preferred Alternative

Alternative plans were formulated as required by NRCS policy and the Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies (P&G) (USWRC, 1983). According to P&G, an alternative that reasonably maximizes net national economic development benefits while protecting the Nation's environment is to be formulated. This alternative is to be identified as the NED. Alternative II, Sustainable Irrigation Expansion (SIE), is the NED plan and the Preferred Alternative. This alternative was selected as the Preferred Alternative because it contains components that meet the project purpose, the needs of agricultural producers and land users in the basin, and contribute to the NED objective. A local sponsor (ASWCC) has agreed to fund the local share of the cost. The Preferred Alternative provides funding for projects that will increase irrigation on acreage used for agricultural production within the project area. Conservation measures will be planned and applied based on the NRCS onsite EE/consultations and recommendations in order to increase irrigation efficiencies and/or mitigate possible impact on the surrounding environmental resources.

8.3 Measures to be Installed

The irrigation practices that would be made available for cost-share include the following:

- Low Pressure Center Pivots
- Micro-Irrigation/Subsurface Drip
- Linear/Lateral Irrigation
- Tow/Traveler Irrigation
- Plasticulture
- Hand-Moved/Solid Set Sprinklers

The infrastructure that would be made available for cost-share include the following:

- Phased/Generator Electricity
- Practice 533 Power Units
- Practice 430 Pipes
- Practice 533 Pumps
- Practice 642 Well Development
- Practice 378 conservation practice standard (cps) pond
- Practice 378 Scenario #2: Embankment Pond with Pipe
- NRCS 436cps irrigation reservoir

- Practice 436 Scenario #1: Irrigation Reservoir and Embankment Dam with on-site borrow
- Practice 436 Scenario #2: Irrigation Reservoir with Embankment Reservoir <= 30 Acre-Feet
- Practice 436 Scenario #6: Irrigation Reservoir and Excavated Pit

Furthermore, the SLO will offer a three-year irrigation management plan to all successful applicants which includes conservation agricultural equipment and a user-friendly interface for the farmer. This will be fully covered by the ASWCC. The equipment that will be offered for the purpose of promoting sustainable agricultural and conservative irrigation practices include the following:

- Flow meters
- Soil moisture sensors
- Variable rate irrigation (VRI) components
- Telemetry
- Application Interface

Rather than narrowing each possible combination of proposed works and practices into separate alternatives, this SIE alternative will act as an "umbrella" to provide the necessary flexibility required for appropriately assessing specific practices at the unknown site level. There are three scenarios included within this "umbrella" alternative. Each scenario is defined by what irrigation infrastructure will be eligible for cost-share.

8.4 Minimization, Avoidance, and Compensatory Mitigation Measures

Mitigation must be identified and described in all Watershed Plans. Various forms of mitigation include the following:

1. Avoiding the impact altogether by not taking a certain action or parts of an action.
2. Minimizing impacts by limiting the degree or magnitude of the action and its implementation.
3. Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.
4. Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.
5. Compensating for the impact by replacing or providing substitute resources or environments.

Mitigation measures will be identified and developed through on-farm consultation with the local NRCS-AL district conservationists and will be completed in the same manner required for a typical Environmental Quality Incentives Program (EQIP) practice.

For example, irrigation systems are to be designed and approved by certified irrigation designers or professional engineers; requirements exist for systems to be installed and maintained properly. Soil disturbing practices may be minimized by limiting disturbance and providing temporary erosion control. All local, state and Federal rules concerning worker safety should be observed; measures may include signage, lighting, and access control during and after construction.

The NRCS-AL may find specific mitigation features to be necessary once the onsite EE has been conducted, and recommended conservation measures will be incorporated into site-specific project designs to prevent negatively impacting cultural resources, wetlands, streams, T&E species, etc. Mitigation for impacts associated with on-farm construction will also be provided as needed. These measures may include the BMPs described below.

- Appropriate erosion control measures would be used; ground disturbances would be limited to those areas necessary to safely implement the preferred alternative.
- Adjacent landowners would be provided a construction schedule before construction begins.
- Stormwater and erosion BMPs would be implemented as appropriate.
- Construction would occur outside of the nesting period and outside of the USFWS approved buffer distances for any known bald and golden eagle nests. Should an active bald or golden eagle nest be found during construction, construction would be paused and consultation with a local USFWS biologist would occur to determine subsequent steps.
- Appropriate emission control devices would be required for all construction equipment.
- When needed, water or other dust suppressants would be used on unpaved roads and areas of ground disturbance to minimize dust and any effects on air quality.
- An Inadvertent Discovery Plan would be followed if cultural materials including human remains were encountered during construction. Construction would stop accordingly, SHPO and NRCS-AL cultural resources staff would be consulted, and appropriate tribes would be notified. Continuation of construction would occur in accordance with applicable guidance and law.

Table 8-1 and subsequent sections outline estimated potential concerns due to the expansion of irrigation practices, and strategies to mitigate those concerns.

Table 8-1. Potential Mitigation Measures

Resource Concerns		FWOP (No-Action) Alternative	SIE (Preferred) Alternative
Soil	**Erosion**	N/A	Appropriate erosion control measures would be used. To minimize soil erosion, create positive SOC and N budgets, enhance activity and species diversity of soil biota (micro, meso, and macro), and improve structural stability.
	Soil Quality Degradation	N/A	Site-specific techniques of restoring soil quality could include conservation agriculture, integrated nutrient management, continuous vegetative cover such as residue mulch and cover cropping.
Water	**Water Quantity**	N/A	Irrigation water losses include air losses, canopy losses, soil and water surface evaporation, runoff, and deep percolation. The magnitude of each loss is dependent on the design and operation of each type of irrigation system.
	Water Quality Degradation	N/A	To prevent degradation to surface and groundwater resources through erosion and chemical runoff, BMPs can be implemented to reduce erosion. Proper soil testing can prevent overuse of fertilizers.
Air	**Air Quality Impacts**	N/A	Appropriate emission control devices would be required for all construction equipment. When needed, water or other dust suppressants would be used on unpaved roads and areas of ground disturbance to minimize dust and any effects on air quality.
Plants	**Degraded Plant Conditions**	N/A	Altering the irrigation strategy on site can impact excessive soil salinity (sometimes caused by irrigation and fertilization) can reduce the productivity of many agricultural crops.
Fish and Wildlife	**Inadequate Habitat**	N/A	The potential direct negative environmental impacts of the use of groundwater for irrigation arise from over-extraction, waterlogging and salinization of soils which all have mitigating strategies.
	Livestock Production Limitation	N/A	N/A
Energy	**Inefficient Energy Use**	N/A	Inefficient energy use in irrigation can be mitigated with good maintenance techniques, careful initial planning of water application, and proper irrigation scheduling.

Table 8-1. Potential Mitigation Measures

Resource Concerns		FWOP (No-Action) Alternative	SIE (Preferred) Alternative
Human	**Economic and Social Considerations**	N/A	Adjacent landowners would be provided a construction schedule before construction begins. All local, state and Federal rules concerning worker safety should be observed. Measures may include signage, lighting, and access control during and after construction.
Special Environment		***FWOP (No Action) Alternative***	***Sustainable Irrigation Expansion***
Clean Air Act		N/A	Reducing agricultural emissions that contribute to increased concentrations of particulate matter and NOx in the air, especially from sources near a Class I area, will help mitigate agriculture's contribution to regional haze issues. These emissions include directly emitted particulate matter (dust and smoke are examples) and NOx. Additionally, emissions of ammonia and volatile organic compounds (VOCs), as well as NOx, can contribute to fine particulate matter formation in the atmosphere. Many common NRCS practices can be used to address agriculture's contribution to regional visibility degradation by reducing emissions of these pollutants.
Clean Water Act/ Waters of the U.S.		N/A	To effectively fulfill our CWA Section 404 responsibilities and to prevent project delays, coordination with the Corps, EPA and/or appropriate State agencies is essential. The landowner is responsible for obtaining appropriate permits prior to project implementation, though NRCS often assists to expedite the coordination process. Along with ensuring that the landowner obtains appropriate permits, NRCS should also consider impacts of proposed actions on streams included on States' 303(d) lists and plan accordingly.
Coastal Zone Impacts		N/A	N/A
Coral Reefs		N/A	N/A
Cultural Resources/Historic Properties		N/A	In accordance with the SPPA between the NRCS-AL state office and the AHC (see NRCS-AL, 2017) and NRCS policy (see Title 190, NCRH, Subpart C Section 601.29), an Inadvertent Discovery Plan would be followed if any cultural materials including human remains were encountered during construction. Construction would stop accordingly, SHPO and NRCS cultural resources staff would be consulted, and appropriate Tribes would be notified. Continuation of construction would occur in accordance with applicable guidance and law.

Table 8-1. Potential Mitigation Measures

Resource Concerns	FWOP (No-Action) Alternative	SIE (Preferred) Alternative
Threatened and Endangered Species		If the practice will be placed in a habitat where a threatened or endangered species may reside, further investigation is required. Mitigation strategies include: not altering hydrology of ephemeral drains (avoiding logging during wet weather) within the FWS habitat; increasing buffer distance as needed to maintain the ecological and structural integrity of the riparian buffer and stream bank, and not crossing streams when using an irrigation water conveyance practice.
Environmental Justice	N/A	Given that Houston county and Covington County have lower net incomes on average than other counties within the watershed, it may be advisable to consider the disadvantages these farms may face when considering irrigation expansion, if irrigation expansion is relevant to their practices.
Essential Fish Habitat	N/A	N/A
Floodplain Management	N/A	During the on-site EE, the NRCS will determine if mitigation efforts are needed for pre-existing floodplain of floodway areas. The local floodplain administrator and/or State should work closely with the property owner to discuss any floodplain management requirements or other factors that might impact the selection of a mitigation measure, such as local and state mitigation priorities that should be considered in the selection of a mitigation solution. The goal is to encourage the property owner to select an option that is in the best interest of both the individual and community as a whole. Furthermore, the state may offer information or assistance concerning NFIP program requirements and the coordination of local and statewide mitigation planning. The FEMA Regional Office can assist with mitigation activities, including floodplain management, mitigation project guidance, identification of mitigation funding, cost-benefit project analysis, and environmental issues and requirements.
Invasive Species	N/A	Recognizing and addressing the presence of invasive species is an integral part of the conservation planning process, as well as implementing NRCS policy and any existing county, State, or Federal regulations concerning noxious and/or invasive species. At a minimum, the conservation plan includes: 1) an inventory of invasive species; 2) a map outlining the affected areas; 3) identification of control/restoration strategies, and; 4) analysis of their impacts. Further mitigation efforts and consultations will be considered if determined necessary.
Migratory Birds/ Bald and Gold Eagle Protection Act	N/A	MBTA, BGEPA, and E.O. 13186 require NRCS to consider the impacts of planned actions on migratory bird populations and habitats for all planning activities. This may require cooperation

Table 8-1. Potential Mitigation Measures

Resource Concerns	FWOP (No-Action) Alternative	SIE (Preferred) Alternative
		with the US Fish and Wildlife Service if the action will result in a measurable negative effect on migratory bird populations. For example, if a proposed action can potentially kill or injure a migratory bird resulting in an intentional or unintentional "take" to the birds, nests, or eggs, conservation measures must be considered to mitigate adverse impacts. There are currently no anticipated impacts, but the NRCS will consult with the USFWS in the case where mitigation measures may be needed.
Natural Areas	N/A	N/A
Prime and Unique Farmlands	N/A	N/A
Riparian Area	N/A	Conservation planning in riparian areas requires special considerations. A resource problem within the riparian area may be the manifestation of upland management decisions. If there are sites selected near riparian areas, the NRCS consultation will consider soils, the present plant community, the site potential, geomorphology of both stream and the watershed, hydrologic regime, fish and wildlife needs, the management of the upland areas of the watershed, and the producer's objectives.
Scenic Beauty	N/A	The analysis, conservation and enhancement of scenic beauty is an important part of providing planning assistance. Emphasis will be given to conservation practices that protect and enhance the attractiveness of the landscape while increasing agricultural efficiency and productivity. Through proper planning, the visual characteristics of a scenic landscape can be protected, maintained and improved.
Wetlands	N/A	If wetlands will be impacted by a proposed activity, NRCS will identify whether practicable alternatives exist that either enhance wetland functions and values, or avoid or minimize harm to wetlands. If such alternatives exist, the client will be given the opportunity to select one of those alternatives. If the client selects a practicable alternative, the NRCS may continue technical assistance for the conversion activity as well as the development of the mitigation plan. If a practicable alternative is not selected, NRCS may assist with the development of an acceptable mitigation plan, but no further financial or technical assistance for the wetland conversion activity may be provided.

Table 8-1. Potential Mitigation Measures

Resource Concerns	FWOP (No-Action) Alternative	SIE (Preferred) Alternative
Wild and Scenic Rivers	N/A	Federal agencies must consider the values of these segments prior to taking actions that could exclude them from future wild, scenic, or recreational status. Generally, timber harvests and agricultural operations on privately owned lands are unaffected in wild, scenic, and recreational river designations. However, some activities may require permits or may be covered under special provisions of the management plan. The Federal river manager (each designated river has a manager) may assist and cooperate with state or local organizations, landowners, and individuals to plan, protect, and manage river resources. The assistance may include limited financial assistance.

8.4.1 Soil quality degradation

The state of existing soils can have a large impact on how irrigation and potential erosion can affect both crop productivity and water quality. Soil degradation trends can be reversed by conversion to a restorative land use and adoption of recommended management practices. Mitigating soil degradation includes minimizing soil erosion, creating positive SOC and N budgets, enhancing activity and species diversity of soil biota (micro, meso, and macro), and improving structural stability and pore geometry (Gruver, 2013).

Mitigation Strategies:

- Site-specific techniques of restoring soil quality include conservation agriculture, integrated nutrient management, continuous vegetative cover such as residue mulch and cover cropping, and controlled grazing at appropriate stocking rates. The strategy is to produce "more from less" by reducing losses and increasing soil, water, and nutrient use efficiency.
- Elevated organic matter levels in the top several centimeters of an eroded soil can dramatically increase water infiltration, nutrient cycling, and resistance to detachment (Franzluebbers, 2002).
- Continuous no-till cropping systems with cover crops have been found to be particularly effective because of their ability to quickly enhance levels of organic matter near the surface. Practices that increase infiltration such as cover cropping, conservation tillage, and tile drainage can reduce run-off.
- Terraces and buffer strips can also promote deposition of suspended sediment before it leaves the field.

8.4.2 Water quantity loss based on irrigation method

The five Irrigation Practices available for cost-share include Low Pressure Center Pivots, Micro-Irrigation, Linear/Lateral Irrigation, Tow/Traveler Irrigation, and Plasticulture. Potential water quantity losses may occur due to: air loss, drift, droplet evaporation, canopy evaporation, foliage interception, surface loss, surface water evaporation, and surface runoff. Recommended mitigation strategies for reducing loss of water quantity include using water-efficient technologies in combination with soil enhancing conservation methods and appropriate regulations that limit water allocation and use.

8.4.2.1 Sprinkler Irrigation Losses

Sprinkler packages (especially center pivots), even if properly designed, do not have perfect distribution uniformity. Each nozzle outlet progressively must cover a larger land area (concentric circles) with increasing distance from the center pivot point. Each outlet has a unique and specific discharge rate requirement. However, nozzle outlets are not manufactured in an infinite number of sizes.

Mitigation Strategies:

- **Proper nozzle outlet design:** For a specific nozzle outlet, the designer will select the nozzle outlet size that most closely matches the design specification. Sprinkler

spacing must also be consistent with the manufacturer's recommendations to avoid distribution problems.

- **Reducing runoff:** Slope, surface condition, and infiltration capacity all affect the depth and uniformity of water delivery to the roots. Any runoff from the field or deep percolation would reduce application efficiency by a percentage of the total application amount.

8.4.2.2 Surface Irrigation Losses

Surface irrigation losses include runoff, deep percolation, ground evaporation, and surface water evaporation. Evaporation loss percentages from a surface irrigated field are small and are dependent on system operation. The components of the loss are furrow-water evaporation (under canopy), tailwater evaporation (where there is no canopy protection), and tailwater pit evaporation.

Mitigation Strategies:

- **Field leveling to reduce runoff**: Runoff losses can be significant if tailwater is not controlled and reused. Although use of tailwater reuse pits could generally increase surface application efficiency, many surface irrigators use a blocked furrow to prevent runoff. Leveling the lower portion of a field to redistribute the tailwater over that portion can be helpful. While runoff may be reduced to near zero, deep percolation losses may still be high with this practice.
- **Rapid advance**: This strategy allows better water distribution efficiency and smaller application amounts, which can reduce deep percolation losses and improve overall irrigation efficiency.

8.4.3 Poor Plant Conditions

Excessive soil salinity (sometimes caused by irrigation and fertilization) can reduce the productivity of many agricultural crops, including most vegetables, which are particularly sensitive throughout the ontogeny of the plant (Machado & Serralheiro, 2017).

Mitigation Strategies:

- Irrigation method, management (irrigation scheduling and leaching fraction), and artificial drainage can prevent and mitigate the effects of soil and water salinity by influencing water-use efficiency (WUE) and nutrient-use efficiency, salt accumulation and distribution, and salt leaching.
- Where foliar damage by salts in irrigation water is a concern, irrigation methods such as surface DI and subsurface drip irrigation (SDI) and low energy precision application (LEPA) irrigation must be used. DI and SDI, compared with other irrigation methods, allow for better salinity management by increasing WUE and nutrient-use efficiency.

8.4.4 Maintaining Fish and Wildlife Habitat

Poor water quality below an irrigation project can influence the health of aquatic species. The potential direct negative environmental impacts of the use of groundwater for irrigation arise from over-extraction (withdrawing water in excess of the recharge rate), waterlogging, and salinization of soils.

Waterlogging results primarily from inadequate drainage and over-irrigation and, to a lesser extent, from seepage from canals and ditches. Waterlogging concentrates salts, drawn up from lower in the soil profile, in the plants' rooting zone. Alkalization, the build-up of sodium in soils, is a particularly detrimental form of salinization which is difficult to rectify.

Irrigation-induced salinity can arise as a result of the use of any irrigation water, irrigation of saline soils, and rising levels of saline groundwater combined with inadequate leaching. When surface water or groundwater containing mineral salts is used for irrigating crops, salts are carried out into the root zone. In the process of evapotranspiration, the salt is left behind in the soil, since the amount taken up by plants and removed at harvest is quite negligible.

Mitigation Strategies

- To prevent overdrawing water from streams and rivers, careful ranking criteria will be put in place to prevent the funding of projects that would pull from first and second order streams.
- Promoting flow meters by offering them to users at 100% cost share.
- Many of the soil-related problems could be minimized by installing adequate drainage systems. Drainage is a critical element of irrigation projects, that however still too often is poorly planned and managed.
- Waterlogging can also be reduced or minimized, in some cases, by using micro-irrigation which applies water more precisely and can more easily limit quantities to no more than the crops needs.

8.4.5 Inefficient Energy Use in Irrigation

Water saving irrigation strategies can reduce soil salinization and conserve soil to sustain land productivity and environmental benefits (Pedersen et. al, 2018).

Mitigation Strategies:

- Scheduling consistent irrigation schedule for specific crops.
- Integrating smart sensors into irrigation management systems so that water is only used when needed.
- Maintaining application uniformity.
- Monitor static and pumping water levels each year to monitor potential plugged screens impacting drawdown levels.
- Maintain pumps regularly, including proper greasing and filling oil reservoirs every year.

8.4.6 Pre-Construction

Application Ranking Process

The SLO or its associated districts will take applications from producers and rank applications according to a list of ranking questions. The NRCS will also evaluate each application to help determine the eligibility and ranking score of each. The ranking of each individual project site will help to mitigate the impact that this project might have on impaired waters and other biological resources.

Environmental Evaluation

Before implementing each site-specific project, the onsite Environmental Evaluation (EE) review will occur using the Form NRCS-CPA-52, Environmental Evaluation Worksheet. The onsite EE review is consistent with the tiering process which is when broad programs and issues are described in initial analyses then site-specific proposals and impacts are described in subsequent site-specific studies. The tiering process allows the lead agency to focus on issues that are ripe for decision and exclude from consideration issues already decided on or not yet ripe. Additionally, the CPA-52 Environmental Review and Cultural Resources Review would determine whether further action is required. The EE process would determine if that particular site project meets applicable project specifications, and whether the site-specific environmental effects are consistent with those as described and developed in this Plan-EA.

8.5 Permits and Compliance

The NRCS ensures compliance with the National Environmental Policy Act of 1969. The State Conservationist (STC) is the responsible Federal official who ensures that the Watershed Plan-EIS or Plan-EA complies with NEPA. Additional permits and compliance required for the installation of the potential alternatives will depend on site-specific project proposals and agency consultations. A list of possible permits that may be required was formulated and is described below. This list includes examples brought to the local sponsor's attention but may not represent all necessary permits and compliance measures necessary.

1. A Certificate of Use will be required by the Office of Water Resources (OWR) for the installation of irrigation systems that have the capacity for water withdrawals greater than 100,000 gallons per day.
2. National Pollutant Discharge Elimination System (NPDES) permits will be obtained if necessary. NPDES permits can be issued to individual dischargers or can be issued for a group of dischargers (i.e., general permits). Both individual and general permits contain requirements for controlling pollutant dischargers, monitoring discharges, and reporting compliance.

Furthermore, the following permits and compliance measures have been considered and determined unnecessary regarding the proposed alternatives' project measures:

1. Public Law 83-566 projects are local projects installed with Federal assistance, not Federal projects, and are exempt from the provisions of the Fish and Wildlife Coordination Act (FWCA). The Section 12 addition to Public Law 83-566, which applies the principles of the FWCA to the PL 83-566 program, will be followed.
2. A Section 404 Permit will not be necessary for floating intake.
3. There are no flow standards to comply with currently. The NRCS will be continuously working with USFW to determine flow necessity.

Invitations were sent to agencies and organizations identified as partnering agencies to determine if there are new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts which may require additional permits or compliance. Close cooperation between the NRCS and Federal and State agencies will continue through the duration of the project to ensure project measures follow all necessary compliance and permit procedures accordingly.

8.6 Costs

As described in Section 8.9, the total project cost is $73,670,860 for the SIE Alternative. If available, NRCS would cover $23,130,026 through Public Law 83-566 Funds and the remaining $50,540,835 would be covered by the producer.

Table 8-2 below shows estimated irrigation investment costs by type of irrigation. Because the ideal irrigation system would vary based on conditions at the specific site, we assume investment costs will be on average $2,378/irrigated acre. It is assumed that a well-pivot combination will be utilized given the use of center pivots in the watershed area. As stated in Section 5.3, we assume an increase in irrigated acres of 4,200 per year for four years.

Table 8-2. Irrigation Costs Per Acre for Various Systems

Irrigation Type	Estimated Investment Cost Per Acre	Source
Center Pivot	$1,160-$2,400	Morata, Goodrich, and Ortiz (2019)
Subsurface Drip	$1,200-$1,800	Amosson et al. (2011), Stubbs (2015)
Surface Drip	$860	Stubbs (2015)
Low-Flow Micro Sprinklers	$2,800	Stubbs (2015)
Side Roll or Wheel Move	$610	Stubbs (2015)

8.7 Installation and Financing

8.7.1 Framework for Carrying out the Plan

The plan will be carried out through a partnership between the NRCS, the ASWCC, and the Alabama Agricultural & Conservation Development Commission (AACDC). The ASWCC and the AACDC through a memorandum of understanding will use applicable mechanisms of the existing AACDC cost-share program to implement the project in the basin. This program allows individuals and entities (producers) to apply for cost-share dollars to complete on-farm water supply, distribution, and irrigation practices necessary to install a completed AWM Element listed in the AACDC cost-share manual. The localized development of water sources and irrigation practices along with the required power supply will be funded by Federal funds at approximately 54.5 percent of purchase and installation costs. Federal funds will also be expended to provide NRCS Technical Assistance for installation of the systems.

8.7.2 Planned Sequence of Installation

The sequence for each on-farm installation of an approved AWM Element will be determined by the items that are required on-farm to complete the selected element. Before the start of construction or installation of any individual items of the AWM element, the CPA-52 Environmental and Cultural Resources Review will be completed, and all applicable permits will be obtained by the producer (See Appendix E, Figures E-35-39). Typically, water supply sources and power supplies will be developed first. After development of the water and power supply, the remaining practices which include piping, pumps, pivots or other irrigation methods can be installed in a practically parallel fashion. Mitigation measures will be identified and developed through on-farm consultation with the local NRCS district conservationists and will be completed in the same manner required for a typical EQIP practice. No real property must be acquired by the SLO for installation of the AWM elements since the elements will be installed on property or easements held by the producer.

8.7.3 Responsibilities

The SLO is responsible for implementing the cost-share program with the assistance of the NRCS District Conservationists. The SLO, through a Memorandum of Understanding with the AACDC, will be responsible for developing and implementing a cost-share program to install AWM Elements on-farm. The SLO or its associated districts will take applications from producers, rank applicants, enter into agreements, and pay successful applicants. The SLO or its associated districts will enter into O&M agreements with applicants for the operation and maintenance of the AWM Elements as per the program guidelines. The NRCS will evaluate each application to help determine the eligibility and ranking score of each. Additionally, the NRCS will perform a CPA-52 Environmental Review and Cultural Resources Review to determine whether further action is required. The producer will be required to obtain all applicable permits and certificates, an irrigation design completed by a Certified Irrigation Designer, a Professional Engineer, and/or a Professional Well Driller, necessary

financing to complete the project; and enter into an O&M agreement with the SLO or its associated districts.

8.7.4 Contracting

The SLO (ASWCC) and its associated Soil and Water Conservation Districts will use the standard State of Alabama Cost-Share agreement to contract with the producer to install AWM elements. The AL-SWCC and the associated Districts will work with NRCS during installation of all practices. No LTC will be required for this project.

8.7.5 Financing

The plan does not require the SLO to finance installation. The NRCS will provide 54.5 percent of the equipment purchase and installation of the AWM Elements for each applicant. The remaining 45.5 percent will be provided by the producer through cash on hand or private financing. Operation and maintenance costs will be borne by the producer as per the standard NRCS operations and maintenance agreement. Estimated installation and technical assistance costs and the portion needed from Public Law 83-566 Funds are show in Table 8-3.

8.7.6 Conditions for Providing Assistance

The NRCS will aid the SLO upon implementation of the Cost-Share program described above. The appropriation for funding for NRCS assistance has already been authorized.

Table 8-3. Estimated Project Financing and Costs Choc-Pea Basin Area, Alabama, 2020 Dollars ($)

Works of Improvement	Number				Estimated Cost (Dollars)[1]						
					Public Law 83-566 Funds			Other Funds			Total
	Unit	Federal Land	Non-Federal Land	Total	Federal land NRCS	Non-Federal land NRCS	Total	Federal Land	Non-Federal Land	Total	
Agricultural Water Management	Acres	0	16,800	16,800	0	$21.8M	$21.8M	-	$48.1M	$48.1M	$69.9M
Technical Assistance						$1.3M	$1.3M	-	-	-	$1.3M
Total Project						$23.1M	$23.1M		$18.1M	$18.1M	$74.2M

8.8 Operation, Maintenance, and Replacement

Operation, maintenance, and replacement (OM&R) responsibilities of the AWM Elements will be assumed by the producer (see Appendix D.1 Section 2). The approved producers will sign an O&M agreement for the AWM Elements concurrently with the Cost-Share agreement. The AWM elements and the associated life span for each element is listed in the AACDC Cost-Share Manual, Book 2. Inspection of AWM Elements will follow EQIP standard procedure for similar practices.

The Alabama Irrigator's Pocket Guide 2006 (Equipment Maintenance and Water Management) produced by the National Center for Appropriate Technology and provided by the NRCS-AL and the OWR, a division of the Alabama Department of Economic and Community Affairs provides detailed information for maintenance of pumps and distributions systems and will be available to all participants. Additionally, producers should follow the specific guidelines as outlined by the equipment's manufacturer and distributor for best practices.

8.9 Economic and Structural Tables

The following tables summarize the estimated cost distributions and cost/benefits associated with the Preferred Alternative. See Appendix D for the full NED analysis. Table 8-4 presents the projected installation costs and the percentages of costs to be shared by PL 83-566 and other funding sources. Table 8-5 presents the project's cost distribution, as well as the proportion of PL 83-566 funding and other funding sources. The average annual NED costs are shown in Table 8-6.

Table 8-4. Economic Table 1-- Estimated Installation Cost, Choc-Pea Basin, Alabama, 2020$

Works of Improvement	Number			Estimated cost (dollars)[1,2,3]						
				Public Law 83-566 Funds			Other Funds			Total
	Federal Land	Non-Federal Land	Total	Federal Land NRCS	Non-Federal Land NRCS	Total	Federal Land	Non-Federal Land	Total	
Investment in Irrigation Equipment	0	16,800	16,800	$-	$23,130,026	$23,130,026	$-	$18,174,483	$18,174,483	$41,304,509
Total Project	0	16,800	16,800	$-	$23,130,026	$23,130,026	$-	$18,174,483	$18,174,483	$41,304,509

[1]Price Base: 2020 dollars

[2]Project cost includes 6.25% technical assistance costs

[3]Assume 70% of PL 83-566 funds go towards a 50% cost-share with farmers, while 30% of PL 83-566 funds go towards a 65% cost-share with farmer. Other funds represent farmer contributions.

Table 8-5. Economic Table 2- Estimated Cost Distribution Irrigation Equipment Investment, Choc-Pea Basin, Alabama, 2020$

Works of Improvement	Installation Costs-PL 83-566 Funds[1,2]			Installation Costs-Other Funds			Total
	Construction	Project Admin[3]	Total PL 83-566	Construction	Project Admin	Total Other	
Investment in Irrigation Equipment	$21,769,436	$1,360,590	$23,130,026	$18,174,483	$-	$18,174,483	$41,304,509
Total costs	$21,769,436	$1,360,590	$23,130,026	$18,174,483	$-	$18,174,483	41,304,509

[1]Price Base: 2020 dollars

[2]Assume 70% of PL 83-566 funds go towards a 50% cost-share with farmers, while 30% of PL 83-566 funds go towards a 65% cost-share with farmer. Other funds represent farmer contributions.

[3]Project Admin includes project administration, technical assistance costs and permitting costs.

Table 8-6. Economic Table 4- Estimated Average Annual NED Costs, Choc-Pea Basin, Alabama, 2020$

Works of Improvement	Project Outlays (Amortization of Installation Costs)[1]	Project Outlays (OM&R cost)	Other Direct Costs	Total[1]
Investment in Irrigation Equipment	$2,219,082	$1,360,326	$-	$3,579,409
Total	$2,219,082	$1,360,326	$-	$3,579,409

[1] Price base: 2020 dollars, amortized over 24 years at a discount rate of 2.75%

Table 8-7 summarizes annual average damage reduction benefits, while Table 8-8 compares them to the annual average project costs presented in Table 8-6. Onsite damage reduction benefits that will accrue to agriculture and the local rural community include reduction in crop loss. Offsite benefits include reduced carbon dioxide emissions and nitrogen export to waterways.

Table 8-7. Estimated Average Annual Watershed Protection Damage Reduction Benefits, Choc-Pea Basin, Alabama, 2020$

Item	Damage Reduction Benefit, Average Annual	
	Agricultural-Related[1]	Non-Agricultural Related[1]
Onsite Damage Reduction Benefits	$3,947,020	$-
Subtotal	$3,947,020	$-
Offsite Damage Reduction Benefits	$0	
External Carbon Dioxide Reduction		$75,127
External Nitrogen Load Reduction		$180,561
Subtotal	$0	$255,689
Total Quantified Benefits	$3,947,020	$255,689

[1]Price base: 2020 dollars, amortized over 24 years at a discount rate of 2.75%

Table 8-8. Comparison of Average Annual NED Costs and Benefits, Choc-Pea Basin, Alabama, 2020$

Works of Improvement	Agriculture Related[1]	Non-Agriculture Related[1]	Average Annual Benefits[1]	Average Annual Costs[2]	Benefit Cost Ratio
Investment in Irrigation Equipment	$3,947,020	$255,689	$4,202,709	$3,579,409	1.17
Total	$3,947,020	$255,689	$4,202,709	$3,579,409	1.17

[1]Price base: 2020 dollars, amortized over 24 years at a discount rate of 2.75%
[2]From Economic Table 4

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10. List of Preparers

The draft watershed plan and environmental assessment was reviewed and concurred with by State staff specialists having responsibility for engineering, soils, agronomy, range conservation, biology, cultural resources, forestry, and geology. This review will be followed by a review of the document by the NWMC. A similar review was also provided by U.S. Forest Service personnel.

Name, Title, Employer	Education	Discipline	Experience (Years)
Eve Brantley, Associate Professor & Extension Water Resources Specialist, Auburn University	Ph.D.	Watershed Planning, Riparian Ecology	22
Cameron Handyside, UAH Research Engineer	M.S.	Civil/Environmental Engineering, Crop Modeling, Hydrology Modeling, GIS	30
Rachel Kuntz, Auburn University Assistant Researcher	B.S.	Environmental Science	2
Sara Bolds, Auburn University Associate Researcher	M.S.	Invasive Species, Water Quality	4
Bethanie Hartzog, Auburn University Undergraduate Assistant Researcher	B.S. Student	Agricultural Communications	1
Jessica Curl, Auburn University Assistant Researcher	B.S.	Environmental Science	1
Kevin Doty, UAH Research Scientist	Ph.D.	Atmospheric Science, Weather/Climate Modeling, Hydrology Modeling	20
Maury Estes, Research Scientist, UAH	Ph.D.	Plant and Soil Science, Ecological and Hydrologic Modeling, Environmental Planning	32
Max W. Runge, AU Faculty & Extension Professor Agricultural Economics	MBA, M.S.	Agriculture and Resource Economics	29
John Christy, Professor and Director, Earth System Science Center, UAH	Ph.D.	Atmospheric Science, Climate Modeling	40
James Cruise, Professor Emeritus	Ph.D.	Civil Engineering/Hydrology	45

11. Distribution List

The appropriate local, State, and Federal agencies, community representatives, and NGOs will be sent the Draft Watershed Plan-EA. Those groups include the following:

- Alabama Agricultural & Conservation Development Commission
- Alabama Association of Conservation Districts
- Alabama Department of Conservation and Natural Resources
- Alabama Department of Economic and Community Affairs/Office of Water Resources
- Alabama Department of Environmental Management
- Alabama Governor's Office
- Alabama Natural Resources Conservation Service
- Alabama Rivers Alliance
- Choctawhatchee Riverkeeper
- Choctawhatchee, Pea and Yellow Rivers Watershed Management Authority
- Geological Survey of Alabama
- National Marine Fisheries Service
- National Oceanic and Atmospheric Administration Fisheries
- Soil and Water Conservation District Offices in Barbour, Bullock, Coffee, Covington, Dale, Geneva, Henry, Houston, and Pike Counties
- State Historic Preservation Office
- The Nature Conservancy
- Tribal Governments and Tribal Historic Preservation Officers listed in Section 3.2
- U.S. Army Corps of Engineers
- U.S. Department of Agriculture, Farm Service Agency
- U.S. Department of Agriculture, Rural Development
- U.S. Environmental Protection Agency
- U.S. Fish and Wildlife Service

12. Acronyms, Abbreviations, and Short Forms

AACD	Alabama Association of Conservation Districts
AACDC	Alabama Agricultural & Conservation Development Commission
AADT	Average Annual Daily Traffic
ACES	Alabama Cooperative Extension System
ACHP	Advisory Council on Historic Preservation
ACROD	Alabama Cultural Resources Online Database
AEP	Annual Exceedance Probability
AHC	Alabama Historical Commission
AHCR	Alabama Historic Cemetery Register
AL	Alabama
ALFA	Alabama Farmers Federation
ARLH	Alabama Register of Landmarks and Heritage
ASWCC	Alabama Soil and Water Conservation Committee
AU	Auburn University
AWM	Agricultural Water Management
BCC	Birds of Conservation Concern
BGEPA	Bald and Golden Eagle Protection Act
BLS	Below land surface
BMP	Best Management Practices
C	Celsius
cfs	Cubic feet per second
cps	Conservation Practice Standard
CPYRWMA	Choctawhatchee, Pea, and Yellow Rivers Water Management Authority

CPYRWMP	Choctawhatchee, Pea, and Yellow Rivers Watershed Management Plan
CWP	Clean Water Partnership
DI	Drip Irrigation
DO	Dissolved Oxygen
DPM	Diesel Particulate Matter
ECOS	Environmental Conservation Online System
EE	Environmental Evaluations
EIS	Environmental Impact Statement
EJ	Environmental Justice
EPA	Environmental Protection Agency
ESU	Evolutionarily Significant Unit
ET	Evapotranspiration
EQ	Environmental Quality
EQIP	Environmental Quality Incentives Program
FONSI	Finding of No Significant Impact
FR	Feasibility Report
FSA	Farm Service Agency
ft	feet
FWCA	Fish and Wildlife Coordination Act
FWOP	Future Without Project
gpm	Gallons Per Minute
GSA	Geological Survey of Alabama
HU	Historically Underserved
HUC-12	Hydrologic Unit Code-12
IPaC	Information for Planning and Consultation
Km	Kilometer

LAI	Leaf Area Index
LEPA	Low Energy Precision Application
MBTA	Migratory Bird Treaty Act
MCLG	Maximum Contaminant Level Guideline
MGD	Millions of gallons per day
MSL	Mean Sea Level
NED	National Economic Development
NEPA	National Environmental Policy Act
NGO	Non-Governmental Organization
NHDplusV2	National Hydrography Dataset Plus
NHL	National Historic Landmark
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanographic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NPS	U.S. National Park Service
NRCS-AL	Alabama Natural Resources Conservation Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NW FL WMD	Florida Northwest Water Management District
NWMC	National Water Management Center
NWPH	National Watershed Program Handbook
NWPM	National Watershed Program Manual
OAR	University of Alabama – Office of Archaeological Research

OIA	Outdoor Industry Association
OMB	Office of Management and Budget
OM&R	Operation, Maintenance, and Replacement
OWR	Office of Water Resources
PBL	Planetary Boundary Layer
PET	Potential Evapotranspiration
P&G	Economic and Environmental Principles and Guidelines
PI	Preliminary Investigation
Plan-EA	Plan- Environmental Assessment
PM2.5	Particulate Matter
PPT	Precipitation
RED	Regional Economic Development
RMSE	Root Mean Square Error
ROD	Record of Decision
R2NSE	Nash-Sutcliffe Efficiency Statistic
SAIPE	Small Area Income and Poverty Estimates
SDI	Subsurface Drip Irrigation
SHUs	Strategic Habitat Units
SIE	Sustainable Irrigation Expansion
SLO	Sponsoring Local Organization
SMREC	Sand Mountain Research and Extension Center
SPPA	State-based Prototype Programmatic Agreement
SRA	Statewide Resource Assessment
SRRUs	Strategic River Reach Units
SSURGO	NRCS Soil Survey Geographic Database
STATSGO	State Soil Geographic Dataset

STC	State Conservationist
TDS	Total Dissolved Solids
T&E	Threatened and Endangered
THPOs	Tribal Historic Preservation Officers
TMDL	Total Maximum Daily Loads
TN	Total Nitrogen
TR	Technical Release
TSS	Total Suspended Solids
TVREC	Tennessee Valley Research and Extension Center
U.S.	United States
UAH	University of Alabama in Huntsville
USACE	U.S. Army Corps of Engineers
USDA	United States Department of Agriculture
USDA NASS	United States Department of Agriculture- National Agricultural Statistics Service
USFWS	U.S. Fish and Wildlife Service
VOC	Volatile Organic Compounds
VRI	Variable Rate Irrigation
WUE	Water-Use Efficiency